Cascade County			
	Hughesville	Block P Tailings	PA # 07-090
		Galena Creek Sampling	PA # 07-090
		Bon Ton	PA # 07-094
	Neihart	Vilipa	PA # 07-080
		Molton	PA # 07-084
		Evening Star Millsite	PA # 07-087
		Compromise	PA # 07-100
		Carpenter Creek Tailings	PA # 07-103
		Rochester	PA # 07-110
		Silver Belt	PA # 07-111
		Fairplay	PA # 07-112
		Atlantus	PA # 07-113
		Stallabrass	PA # 07-120
		Dacotah	PA # 07-121
		Maud S.	PA # 07-129
		Neihart Tailings	PA # 07-134
		Silver Dike Adit	PA # 07-135
		Silver Dyke Tailings	PA # 07-137
		Silver Dyke Millsite	PA # 07-138
		Sherman No. 2	PA # 07-140
		Sherman No. 2	PA # 07-142
		Big Seven	PA # 07-156
		Baker	PA # 07-180
Deer Lodge County			
	Orofino	Champion	PA # 12-003
	Silver Lake	Cable	PA # 12-002
		Gold Coin Mine	PA # 12-004
		Silver Lake Millsite	PA # 12-070
Fergus County			
	Warm Springs	Tail Holt	PA # 14-010
		Cumberland	PA # 14-017

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CASCADE

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HUGHESVILLE

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: BLOCK P TAILINGS **PA#:** 07-090

Date: June 7, 1993 **Time:** 0830

Field Team Leader: Bullock, Babits; Pioneer

Sampling Personnel: Flammang, Lasher, Clark;
Pioneer
Pierson; TD&H

Visitors: None

Weather/Seasonality Observations: Rainy; cold (35°F); breezy. It rained during the previous night and through the entire sampling investigation.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number)**:** None taken

General Comments/Observations (not covered specifically in attached Inventory Forms)**:** The Block P Tailings were not investigated by Pioneer because of extensive studies previously conducted; however, upgradient and downgradient surface water and sediment samples were collected along Galena Creek and corresponding tributaries to determine the impact. Sampling of Galena Creek was done based on sample locations from previous sampling conducted by MDSL/AMRB (Chen-Northern.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Relocate lower tailings to upper (approximately 1 mile) and situate all tailings out of the floodplain; recontour, cap, and revegetate to avoid erosion of tailings and releases of metals. Study water treatment requirements.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): BLOCK P TAILINGS PA#: 07-090

Legal Description: T 15N ;R 8E ;Sec. 13 , SE1/4All1/4 1/4

County: CASCADE Mining District: BARKER/HUGHESVILLE

Latitude: N 47° 03' 20" Longitude: W 110° 38' 56"

Primary Drainage Basin and Code: Dry Fork Belt Creek/10030105
Secondary Drainage Basin: Galena Creek

USGS Quadrangle map name(s): Barker

Mine Type/Commodities: Hardrock/Lead, Silver

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Public
Owner, Agent, or Contact(Include address and phone when available): Lewis and Clark National Forest.

Relationship to other mines/sites in the area/district: This site is located south of the Block P Mine (23-001), Belt Patent (23-035), and the Marcelline Mine (23-022) and southeast of the Wright Lode (23-045) and Edwards (23-046).

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? The Hughesville district is currently listed under the CECRA Program.

General site features: Elevation 5430' , Slope 0-25% ,
Aspect Northwest

Land use: Mining___, Recreational X , Residential X , Urban___,
Agricultural X , Other(Specify)

Area of disturbed/unvegetated lands? Approx. 15 acres.
Dimensions: 635,000 cu. yds. of mill tailings at the site and 250,000 cu. yds. at the lower tailings pond

Predominant vegetation types: Douglas fir, spruce, shrubs, grasses

Access: roads - good X ,poor___,4wd___,trail___.
Other logistical considerations (proximity to other sites). Adjacent to Galena Creek; accessed via USFS Road No. 120, which joins with Hwy. 89 near Monarch.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There is 1 well log within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). The site is underlain by tertiary granopiorite intruded into Precambrian metasediments.

Mining/milling history, ore type/tenor, host rock, gangue: The 400-ton selective floatation plant was constructed in 1927. An aerial tramway carried ore from the mine to the mill.

Mine Operation?
Shafts - Yes___, No X, # ____, Comment
Adits - Yes___, No X, # ____, Comment
Pits - Yes___, No X, # ____, Comment
Placers - Yes___, No X, # ____, Comment
Other - Yes___, No X, # ____, Comment

Mill Operation? Yes X, No___. If yes answer the next three questions:

Period(s) of Operation: 1800 to 1940

Origin of Ore Milled - Custom Mill X Dedicated Mill___; Number and names of mines that supplied mill feed: Most of the ore processed at the facility was derived from the Block P Mine; surrounding mines are Edwards, Wright Lode, Marcelline, Danny T, Liberty and Carter.

Process? Hg-amalgam, CN^- leach (vat, heap), floatation, smelting?
400-ton selective floatation

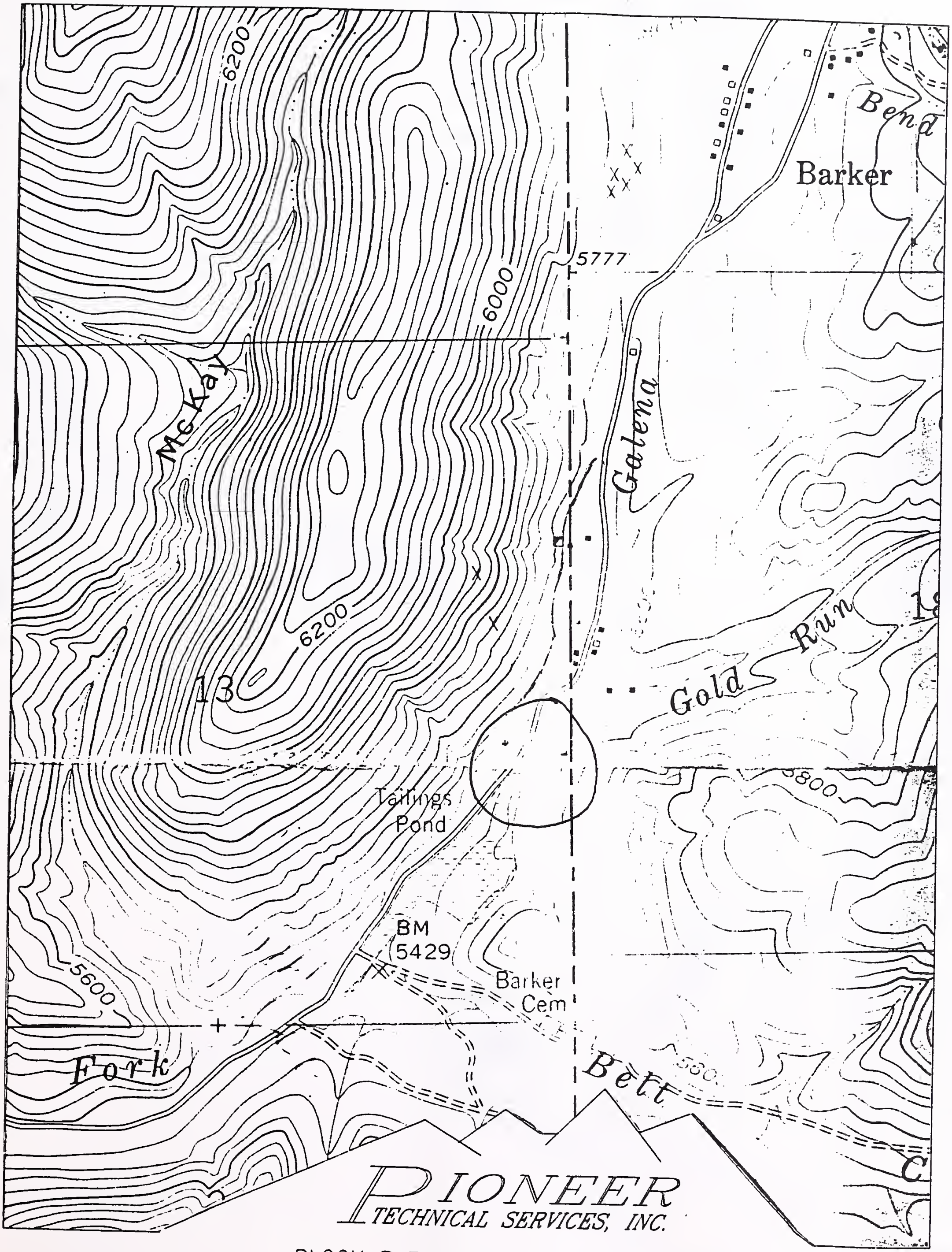
Montana Bureau of Mines and Geology
Water Well Log Data

05/12/1993

Well No.: M:1996
Location: 16N 09E 04 BACB
Site Name: MALMBERG, SWEDE*13 MI W SURPRISE CK COLONY
County: Judith Basin
Depth: 320.0
Yield: 6.0
Static Water Level: 171.11
Pumping Water Level: 220.0
Year drilled: 1978
Driller: THATCHER DRILLING
Driller's License: 305
DNRC Well No.: 19819

Well No.: M:28095
Location: 16N 09E 04 BBDA
Site Name: MALMBERG SWEDE
County: Judith Basin
Depth: 441.0
Yield: 3.0
Static Water Level: 377.00
Pumping Water Level: 280.0
Year drilled: 1976
Driller: THATCHER DRILLING
Driller's License: 086
DNRC Well No.:

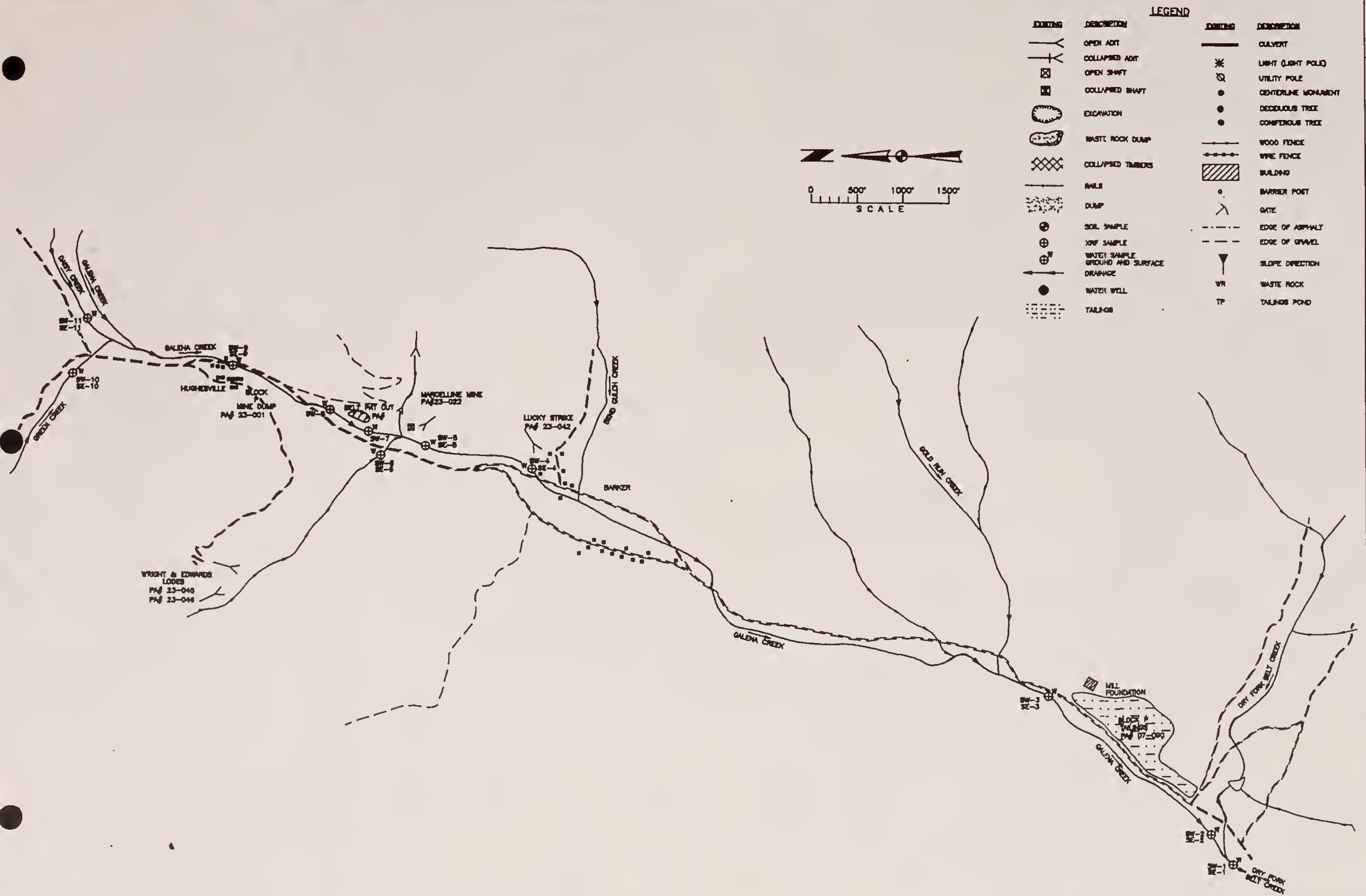
Well No.: M:28096
Location: 16N 09E 07 ADCB ←
Site Name: BODNER MIKE
County: Judith Basin
Depth: 70.0
Yield: 26.0
Static Water Level: 0.00
Pumping Water Level: 24.0
Year drilled: 1958
Driller:
Driller's License:
DNRC Well No.:



PIONEER
TECHNICAL SERVICES, INC.

BLOCK P TAILINGS, P.A. NO. 07-090

T15N, R08E, SECTION 13
SCALE: 1" = 1000'



DRAWN MWC DATE 10/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

PIONEER

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS-BOZEMAN-KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

GALENA CREEK SAMPLE LOCATIONS
HUGHESVILLE DISTRICT JUDITH BASIN COUNTY

SHEET NO.

GALENA.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution(approximate % sand, silt, & clay): Hand augering in the lower pond revealed a zone of very fine-grained pyrite crystals at a depth of 48" to 66". Zone of medium gray, very plastic, sticky silt loam to clay loam at 66" to 78". Lower tailings were saturated at 84". At the upper pond, there is a zone of dark gray clay loam near the base of the tailings. Dark gray zone is mostly saturated and thickest area of tailings is 18' to 25' at the southern end. No coarse fragments were observed in either of the ponds.

Determine tailings impoundment depth and describe stratification of the tailings if observable(based on texture and color): At a site at the southern end of the pond, the impoundment depth is greater than 132".

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): Dry at the lower tailings and wet at depth.

Describe condition of the tailings impoundment(Note condition of dams or structures, location of breaches): Lower tailings impoundment is located in the Galena Creek floodplain.

Comments on potential for mitigation: Relocate lower tailings to upper and remove all from floodplain and revegetate.

Bibliography

Economic Geology, Geological Observations of the Block P Mine, Hughesville, Montana, Volume 33, Written by Kiril Spiroff, 1938, pp. 554-567.

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDHES/SHWB, Superfund Basics, Overview and Accomplishments of Superfund in Montana 1983-1993, November 1993.

MDHES/WQB, Analytical Data for Block P Tailings, December 7, 1979.

MDSL/AMRB, Hughesville/Barker Mining District Galena Creek Drainage Preliminary Assessment Project Report, Prepared by Chen-Northern, Inc., March 1991.

MDSL/AMRB, Program Narrative for Block P Tailings, Prepared by Chen-Northern, Inc., November 2, 1990.

MDSL/AMRB Files, Abandoned Mine Lands National Inventory, Phase II Problem Area Data Sheet for Block P Tailings, Prepared by Mark Carlstrom and Ben Mundie, December 7, 1979.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Block P Tailings, Prepared by Delta Engineering, Date Unknown.

MDSL/AMRB Files, Environmental Assessment Analytical Data for Block P Tailings, Prepared by MSE, Inc., October 29, 1990.

USGS, Topographic Map, Barker, Montana, 7 1/2 minute Quadrangle, 1961.

Witkinn, J.J., Geologic Map of the Barker Quad, Judith Basin and Cascade Counties, Montana, Map GQ-898, 1971.

LABORATORY ANALYTICAL DATA

BLOCK P TAILINGS
PA NO. 07-090

Block P. Tailings PA# 07-090
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BULLOCK
INVESTIGATION DATE: 06/07/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
07-090-SE-1	396	486	9.4 J	7.7 J	8.5	182 J	51700	0.147 J	3120 J	25 J	705	5 U	1590 J	NR
07-090-SE-2	140	97.3	13.2 J	7 J	3.9	149 J	21600	0.037 J	2720 J	18 J	1070	3 U	2080 J	0.31 U
07-090-SE-3	196	123	11.1 J	7.6 J	2.8	149 J	26700	0.045 J	4030 J	23 J	1110	4 U	1970 J	0.57

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
07-090-SW-1	9.92	40.7	2.9	5.99 U	5 U	23.5	1390	0.038 U	790	8.78 U	6.75	36.9	632	66.2
07-090-SW-2	54.5	45.4	16.3	5.99 U	5 U	121	6040	0.038 U	3890	19.1	38.7	33	3670	105
07-090-SW-3	16.8	45.2	15.5	5.99 U	5 U	100	4360	0.038 U	3640	18.8	39	33.5	3440	97.4

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
07-090-SW-1	72	< 5.0	23	< 0.05	NR
07-090-SW-2	190	< 5.0	106	< 0.05	0.02
07-090-SW-3	146	< 5.0	87	< 0.05	0.01

LEGEND

SE1 -	In Dry Fork Belt Creek below confluence with Galena Creek.
SE2 -	Before confluence with Dry Fork Belt Creek in Galena Creek, approx. 425'.
SE3 -	Upgradient of Block P. Tailings below confluence with Gold Rush Creek.
SW1 -	Same as sample SE1.
SW2 -	same as sample SE2.
SW3 -	Same as sample SE3.

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: ______

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
TP-1	pH; ESD	Partial	650,000	600,000	Yes	Moderate

Notes and Clarifications: ______

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes_____, No_X_, Describe:______________________

Population within 1 mile: 1-10___; 10-30_X_; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments_Increases during summer months_

Evidence of recreational use on site: Yes_X_, No___, Describe:_Off-road vehicle tracks on lower pond_

Accessibility - Fences, warning signs, closed roads?_There is a barbed wire fence around part of the site._

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment______________
Wilderness Area - Yes___, No_X_, Comment______________
T&E Species Habitat - Yes___, No_X_, Comment______________
Bat Habitat - Yes___, No_X_, Comment______________

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High___, Medium_X_, Low___
Wetlands Frontage - High___, Medium___, Low_X_
Fisheries Habitat and Species Classification - _6_
Sport Fishery Classification - _6_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes___, No_X_, Number____, types and locations:___

Hazardous structures: Yes___, No_X_, Number____, types and locations:_

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____, types and locations:______________

Unstable waste piles, impoundments, undercut banks: Yes_X_, No____, Number_1_, types and locations:_Upper tailing is severly eroding, creating several large crevices._

Fire and/or Explosion hazards: Yes___, No_X_, Explain:______________

SURFACE WATER INVENTORY FORM

SAMPLERS: Bullock, Babits, Flammang, Pierson, Lasher, Clark

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	In Dry Fork Belt Creek below confluence with Galena Creek	6.65	210	145	5.4	63	45.66 cfs (M)	07-090-SW-1	06/07/93 0830	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-1	SE	In Dry Fork Belt Creek below confluence with Galena Creek	N/A	N/A	N/A	N/A	N/A	N/A	07-090-SE-1	06/07/93 0830	T-Metals
SW-2	SW	Before confluence with Dry Fork Belt Creek in Galena Creek approx. 425 feet	6.8	290	249.6	6.3	27	9.67 cfs (M)	07-090-SW-2	06/07/93 0915	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-2	SE	Before confluence with Dry Fork Belt Creek in Galena Creek approx. 425 feet	N/A	N/A	N/A	N/A	N/A	N/A	07-090-SE-2	06/07/93 0915	T-Metals
SW-3	SW	Upgradient of Block P Tailings below confluence with Gold Run Creek	6.62	371	442	6.2	29	9.81 cfs (M)	07-090-SW-3	06/07/93 0915	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-3	SE	Upgradient of Block P Tailings below confluence with Gold Run Creek	N/A	N/A	N/A	N/A	N/A	N/A	07-090-SE-3	06/07/93 0915	T-Metals

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______________________

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? Approximately 15 acres south of the tailings area

Wetlands present: Yes X , No ___, Describe: Natural wetlands along the Dry Fork Belt Creek south of the tailings

Carbonate rocks/soils: Yes X , No ___, Describe: Located at Chen-Northern's monitoring well HMW-2 at eight feet below ground surface is a limestone unit believed to be associated with the Cambrian Pilgrim Formation.

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X ; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments Mostly seasonal residents

Nearest residence(ft or miles)? Approximately 1/4 mile

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

GROUNDWATER INVENTORY FORM

SAMPLERS: ______

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______

______

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X , No ___, Name(s): Galena Creek and Gold Run Creek

Dry streambeds: Yes ____, No X , Name(s): ____

Other surface water: Yes ____, No X , Name(s)/Description: ____

Waste materials within any floodplain: Yes X , No ___ Source ID(s): Tailings are adjacent to Galena Creek.

Approximate Flood frequency? ___ 1 yr, X 10 yr, ___ 100 yr

Estimated seasonal flow of stream(s) (cfs)? 6 during Galena Creek investigation (07-090)
High Flow: 30 cfs , Average Flow: 6 cfs

Distance between waste source(s) and nearest surface water body (ft)? 0 feet

Surface water draining onto or through waste sources: Yes X , No ____, Describe: Galena Creek is flowing adjacent to and eroding Block P Tailings.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?) Possible irrigation for residential use and Dry Fork Belt Creek has fishery, wetlands, stock watering, and irrigation. Above confluence with Galena Creek, Dry Fork Belt Creek is reported to contain cutthroat trout (sensitive species).

Observed erosional/sedimentation/stream turbidity problems? Yes X , No _____, Distance downstream (ft)? 2000 Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): Severe erosional problems from tailings; runoff on tailings causes severe erosion and acid water formation.

SOURCE INVENTORY FORM

SAMPLERS: ____________________

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN- MENT	pH SU (D/S)*	RADIO- ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
N/A									

*D-Direct reading (Kelway Meter); S-Saturated Paste (Orion Meter)

Comments or deviations from SOPs: ____________________

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No X , Number:____ Identification:____________

Filled shafts: Yes___, No X , Number:____ Identification:____________

Seeps/Springs: Yes___, No X , Number:____ Identification:____________

Groundwater wells within 5 miles?: Yes X , No___;
Number of well logs: 21

Distance to nearest well used for drinking? In Barker

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite X , Probable____, Possible____, Unlikely____.
Groundwater at base of tailings with elevated metal values.

Other observations/notes: MDSL/AMRB (Chen-Northern) installed seven monitoring wells around the tailings and one was previously installed by Amax. In most monitoring well locations when drilling wells borehole cuttings revealed that the tailings were on top of dry waste rock, then competent aphanitic intrusive rhyolite and crystalline syentite and limestone bedrock. Stated that the Block P Mine dump did not appear to within the influence of groundwater and the tailings.

SUMMARY OF HISTORICAL ANALYTICAL DATA FROM OTHER SOURCES

DATE: October 29, 1990

CLIENT: Abandoned Mines

FIELD ID: Black P Tailings--08/16/90

LAB NO: S2708

DATE RECEIVED: 09-24-90

pH (1:1 slurry) 1.91 SU

Total Metals

As	722	mg/Kg
Cd	<1	mg/Kg
Cu	180	mg/Kg
Fe	86,000	mg/Kg
Pb	1760	mg/Kg
Zn	1000	mg/Kg

DATE: October 29, 1990

CLIENT: Abandoned Mines

FIELD ID: Block P Conc. from Bin--08/17/90

LAB NO: S2680

DATE RECEIVED: 09-24-90

pH (1:1 slurry) 2.01 SU

Total Metals

As	1890	mg/Kg
Cd	222	mg/Kg
Cu	1190	mg/Kg
Fe	30,500	mg/Kg
Pb	41,200	mg/Kg
Zn	34,900	mg/Kg

STATE HEALTH DEPT. WATER QUALITY BUREAU HELENA, MONTANA 59601

STATE	MONTANA	COUNTY	JUDITH BASIN
LAT.-LONG.	47 322N 11039 0W	SAMPLE LOCATION	15N 8E 13D
STATION CODE		ANALYSIS NUMBER	79W3086
DATE SAMPLED	12-07-79	DRAINAGE BASIN	0410 -M.MISSOURI
TIME SAMPLED		WATER FLOW RATE	130. GPM(E)
METHOD SAMPLED	GRAB	FLOW MEASUREMENT METHOD	FLOAT + TIME
SAMPLE SOURCE	STREAM	ALTITUDE OF LAND SURFACE	5480. FT
WATER USE	MULTIPLE	TOTAL WELL DEPTH BELOW LS	
AQUIFER(S)		SWL ABOVE(+) OR BELOW LS	
SAMPLED BY	DSL	SAMPLE DEPTH BELOW SURFACE	

SAMPLING SITE: HUGHESVILLE BELOW TRILINGS POND

	MG/L	MEQ/L		MG/L	MEQ/L
CALCIUM (CA)			BICARBONATE(HCO3)		
MAGNESIUM (MG)			CARBONATE (CO3)		
SODIUM (NA)			CHLORIDE (CL)		
POTASSIUM (K)			SULFATE (SO4)		
			FLUORIDE (F)		
			PHOSPHATE(PO4 AS P)		
			NO3+NO2 (TOT AS N)		
SUM CATIONS	0.0	0.0	SUM ANIONS	0.0	0.000

LABORATORY PH		TOT HARDNESS(MG/L-CACO3)	
FIELD WATER TEMPERATURE (C)		TOT ALKALINITY(MG/L-CACO3)	
SUM-DISS. IONS MEAS.(MG/L)		LABORATORY TURBIDITY (NTU)	
LAB CONDUCTIVITY-UMHOS-25C		SODIUM ADSORPTION RATIO	

ADDITIONAL PARAMETERS

ARSENIC.TR (MG/L AS AS)	.004	CADMIUM, TR (MG/L AS CD)	.03
COPPER.TR (MG/L AS CU)	.10	LEAD.TR (MG/L AS PB)	.07
ZINC.TR (MG/L AS ZN)	5.81	IRON.TR (MG/L AS FE)	4.91
MANGANESE.TR(MG/L AS MN)	6.42	PH.FIELD(SU)	6.5
NICKEL.TR (MG/L AS NI)	< 0.10		

REMARKS: A M L

EXPLANATION: MG/L=MILLIGRAMS PER LITER MEQ/L=MILLIEQUIVILENTS PER LITER
ALL CONSTITUENTS DISSOLVED (DISS) EXCEPT AS NOTED. TOT=TOTAL SUSP=SUSPENDED
(M)= MEASURED(R)=REPORTED (E)=ESTIMATED M=METERS TR=TOTAL RECOVERABLE

SAMPLE NO AML 55 SAMPLER BAM HANDLING 11 ANALYST DB LAB WQBH
COMPLETED 01-07-80 COMPUTER RUN 01/28/80 DATA 0975/PROG 0876 FUND 6150

STND DEV. ION BALANCE 0.00	CA	MG	NA	K	CL	SO4	HCO3	CO3	NO3
SEGMENT MPDES	0.0	0.0	0.0	0.0	33.3	33.3	0.0	33.3	0.0

CALC. MEQ/L= INSUFFICIENT DATA 79W3086

TABLE 5-4

AVERAGE CONCENTRATIONS OF TOTAL AND EXTRACTABLE METALS IN WASTE ROCK GALENA CREEK PRELIMINARY ASSESSMENT

PARAMETER	TYPE(1)	MEAN	STANDARD DEVIATION	MINIMUM	MAXIMUM
Aluminum	Total	2,730.0	849.0	1,750.0	4,400.0
	Extract	31.2	25.83	0.40	74.1
Arsenic	Total	416.0	186.0	116.0	840.0
	Extract	0.145	0.154	0.01	0.425
Cadmium	Total	13.2	9.2	0.7	37.0
	Extract	0.266	0.206	0.013	0.698
Chromium	Total	6.0	8.0	1.0	28.0
	Extract	0.07	0.05	0.01	0.15
Copper	Total	269.0	511.0	11.0	2,140.0
	Extract	1.03	0.73	0.12	2.22
Iron	Total	46,870.0	41,410.0	15,400.0	148,000.0
	Extract	108.9	154.6	0.41	493.0
Lead	Total	12,270.0	10,920.0	291.0	34,600.0
	Extract	2.81	1.42	0.17	5.5
Manganese	Total	1,298.0	3,783.0	8.0	15,600.0
	Extract	5.28	6.22	0.12	16.8
Mercury	Total	0.78	0.72	0.07	2.8
	Extract	0.012	0.034	0.001	0.001
Nickel	Total	11.4	10.0	3.0	42.0
	Extract	0.09	0.06	0.01	0.21
Silver	Total	58.0	45.0	4.0	176.0
	Extract	0.03	0.03	0.01	0.11
Zinc	Total	743.0	721.0	78.0	2,800.0
	Extract	37.2	29.9	2.2	98.0

1 Statistics on total metals based on analysis of 18 samples and reported in mg/kg; extract metals were measured in saturated paste extracts (reported in mg/L) and are based on 10 samples.

APPENDIX C-1

XRF DATA BASE, REGRESSION ANALYSES, AND PREDICTIVE CURVES FOR XRF DATA

GALENA CREEK PRELIMINARY ASSESSMENT
XRF CALIBRATION STANDARD MEASUREMENTS
Page 2 of 2

SAMPLE	DATE	AS LAB VALUE	CU LAB VALUE	FE LAB VALUE	MN LAB VALUE	NI LAB VALUE	PB LAB VALUE	ZN LAB VALUE
S1150001		720	46	30700	38	5	11700	314
S1151236		324	76	27500	44	6	4050	130
S1770001		299	88	29100	16	3	10200	453
S1171836		312	93	29300	34	7	23600	340
S1173648		478	111	39600	31	10	24600	975
S1211836		457	32	41100	26	4	4210	313
S1221836		1030	37	59900	29	3	9360	184
S1121561		1330	314	[illegible]	2230	13	10000	860
S1240001		338	35	[illegible]	[illegible]	6	40700	2150
S1240112		311	[illegible]	15670	33	6	3270	252
S1241240		380	11	15700	30	8	291	78
S1300001		510	330	33300	29	3	34000	792
S1301230		840	172	40100	38	10	3170	626
S1330001		2010	566	65400	63	17	16600	4830
S1330324		1600	206	25200	40	10	13100	553
S1341022		897	36	37000	1410	16	1030	249
S1350001		220	40	17400	13	13	22000	338
S1351536		116	129	15400	31	8	12200	1000
S1361536		164	160	18500	29	10	22600	2000
S1076672		500	79	27300	10	12	2310	562
S1094866		698	157	91500	67	22	2070	905
S1096613		2140	688	141000	115	33	4460	76
S1120001		920	312	50400	1630	14	10600	731
S1122162		640	190	33900	1440	21	680	321
S1000001		920	220	23200	28	13	13500	3010
S1000118		2040	130	60000	180	23	6340	630
S1001836		9	187	23500	123	37	91	478
S1020001		610	138	22900	38	10	6130	553
S1020848		160	268	57300	1340	24	451	1220
S1024860		16	369	12300	94	22	408	858
S1050001		690	349	26100	26	11	12200	1450
S1050106		1050	410	34400	76	12	18500	1090
S1050612		1910	980	73600	10900	27	1540	1070
S1070001		520	254	43400	18	16	4000	588
S1070166		730	179	78400	6	22	2310	950
S1370001		270	2140	134000	15600	42	8690	1580
S1370124		490	483	121000	5108	30	1340	613
S1372448		670	845	148000	2040	22	4100	503
HMW51011		560	106	37800	216	9	11500	2800

GALENA CREEK PRELIMINARY ASSESSMENT
XRF CALIBRATION STANDARD MEASUREMENTS
Page 1 of 2

SAMPLE	DATE	AS XRF INDEX	CU XRF INDEX	FE XRF INDEX	MN XRF INDEX	NI XRF INDEX	PB XRF INDEX	ZN XRF INDEX
S1150001	121990	1.00	0.37	2.00	1.82	0.49	1.88	0.33
S1151236	121990	0.96	0.38	2.49	2.28	0.51	1.77	0.34
S1770001	121990	1.45	0.43	2.24	2.04	0.53	2.74	0.43
S1171836	121990	1.93	0.52	2.55	2.38	0.60	3.72	0.53
S1173648	121990	1.82	0.53	2.73	2.61	0.62	3.40	0.53
S1211836	121990	0.76	0.37	2.63	2.43	0.51	1.39	0.32
S1221836	121990	1.02	0.37	2.81	2.63	0.54	1.87	0.34
S1121561	121990	1.52	0.54	3.79	3.61	0.72	2.76	0.51
S1240001	121990	2.14	0.53	2.13	2.08	0.60	4.17	0.65
S1240112	121990	0.94	0.38	1.78	1.65	0.45	1.81	0.36
S1241240	121990	0.51	0.27	1.40	1.33	0.34	0.94	0.24
S1300001	121990	2.30	0.81	2.60	2.50	0.67	4.78	0.60
S1301230	121990	1.50	0.50	3.09	2.98	0.63	2.74	0.45
S1330001	121990	2.43	0.99	5.23	5.10	1.09	4.45	1.03
S1330324	121990	2.36	0.59	2.14	2.09	0.61	5.00	0.66
S1341022	121990	0.87	0.35	2.87	2.81	0.50	1.17	0.28
S1350001	121990	1.64	0.43	1.48	1.47	0.43	3.23	0.44
S1351536	121990	1.47	0.48	1.44	1.41	0.46	2.86	0.51
S1361536	121990	1.90	0.54	1.59	1.40	0.50	3.76	0.60
S1076372	121990	0.75	0.34	1.74	1.50	0.43	1.36	0.30
S1094866	121990	0.79	0.47	3.77	3.05	0.73	1.45	0.40
S1096613	121990	1.37	1.07	5.44	4.59	1.18	2.28	1.13
S1120001	121990	1.76	0.52	2.33	2.48	0.64	3.34	0.52
S1122162	121990	0.58	0.32	2.09	1.79	0.43	1.04	0.27
S1000001	121990	1.88	0.65	2.10	1.88	0.62	3.55	0.74
S1000118	121990	1.44	0.49	4.20	3.68	0.77	2.50	0.42
S1001836	121990	0.41	0.36	2.30	1.98	0.48	0.76	0.30
S1020001	121990	1.10	0.38	1.71	1.50	0.43	2.06	0.39
S1020848	121990	0.54	0.50	2.98	2.65	0.63	0.99	0.45
S1024860	121990	0.43	0.36	1.12	0.98	0.37	0.81	0.36
S1050001	121990	1.80	0.56	2.18	1.97	0.58	3.32	0.58
S1050106	121990	2.37	0.60	2.61	2.30	0.68	4.37	0.64
S1050612	121990	1.00	0.62	6.82	5.94	1.07	1.62	0.47
S1070001	121990	0.97	0.40	2.30	2.03	0.53	1.81	0.37
S1070166	121990	0.94	0.48	3.48	3.01	0.67	1.65	0.44
S1370001	121990	0.87	0.66	7.44	7.00	1.16	1.63	0.52
S1370124	121990	0.71	0.58	7.70	6.81	1.15	1.26	0.40
S1372448	121990	0.94	0.63	9.43	8.35	1.38	1.71	0.40
HMW51011	121990	1.25	0.50	2.38	2.12	0.57	2.38	0.53

GALENA CREEK PRELIMINARY ASSESSMENT
SOIL/MINE WASTE XRF INDEX AND PREDICTED METAL CONCENTRATIONS
Page 1 of 3

SAMPLE	DATE	AS XRF INDEX	CU XRF INDEX	FE XRF INDEX	MN XRF INDEX	NI XRF INDEX	PB XRF INDEX	ZN XRF INDEX
HMW52224	121990	0.96	0.41	2.13	1.66	0.54	1.81	0.38
S1010001	121990	4.36	1.93	5.76	5.09	1.64	8.20	2.33
S1010120	121990	1.21	0.44	1.84	1.63	0.50	2.32	0.44
S1030001	121990	1.06	0.40	2.42	2.06	0.55	1.95	0.38
S1030138	121990	2.25	0.84	2.73	2.41	0.77	4.23	0.98
S1033847	121990	2.69	2.61	4.78	4.28	1.69	4.60	3.34
S1040001	121990	1.68	0.66	2.83	2.42	0.71	3.11	0.70
S1040115	122090	2.38	1.07	2.79	2.51	0.87	4.41	1.26
S1041548	122090	1.10	0.43	3.05	2.79	0.53	1.39	0.33
[illegible]	122090	[illegible]	[illegible]	2.12	2.01	0.72	5.33	0.33
S1050412	122090	[illegible]	[illegible]	1.40	1.36	0.37	[illegible]	0.23
S1060001	122090	0.57	0.33	1.34	1.41	0.38	1.05	0.27
S1063648	122090	0.73	0.49	2.73	2.48	0.59	1.34	0.44
S1067292	122090	1.34	0.33	3.37	3.15	0.73	2.36	0.63
S1110001	122090	1.59	0.61	5.43	5.11	0.32	2.32	0.53
S1115084	122090	0.33	0.53	4.74	4.45	0.32	1.62	0.42
S1111081	122090	1.30	0.90	5.46	5.16	1.06	2.04	0.39
S1131236	122090	1.90	0.50	2.32	2.11	0.56	3.37	0.55
S1141230	122090	0.67	0.32	1.30	1.51	0.41	1.29	0.29
S1181236	122090	1.17	0.43	2.75	2.59	0.55	2.18	0.40
S1161230	122090	1.25	0.46	2.01	2.01	0.51	2.40	0.46
S1192846	122090	1.54	0.44	1.81	1.73	0.48	3.00	0.43
S1201836	122090	1.27	0.50	2.06	2.02	0.53	2.45	0.51
S1231830	122090	0.60	0.37	3.78	3.66	0.60	1.10	0.23
S1250114	122090	1.23	0.49	1.92	1.76	0.47	2.23	0.51
S1251436	122090	2.11	0.55	2.19	2.15	0.59	3.97	0.61
S1260001	122090	1.18	0.44	1.99	1.95	0.47	2.23	0.43
S1261236	122090	1.17	0.48	2.41	2.47	0.52	2.24	0.47
S1271236	122090	1.34	0.42	1.47	1.49	0.41	2.57	0.46
S1281236	122090	5.13	1.02	4.13	4.43	1.05	9.63	1.11
S1290001	122090	1.28	0.45	1.88	1.87	0.50	2.45	0.47
S1291230	122090	1.97	0.50	2.13	2.24	0.55	3.79	0.54
S1311236	122090	1.17	0.40	1.58	1.61	0.43	2.18	0.39
S1320001	122090	1.14	0.83	3.74	3.97	0.76	2.09	0.82
S1321230	122090	0.94	0.45	1.73	1.77	0.44	1.83	0.45
S1340001	122090	1.71	0.71	3.34	3.53	0.71	3.22	0.75
S1340108	122090	1.53	0.47	3.04	3.14	0.57	2.81	0.48
S1380001	122090	0.55	0.44	2.77	2.85	0.58	1.00	0.34
S1380112	122090	0.43	0.29	1.35	1.40	0.33	0.81	0.26
S1383648	122090	0.41	0.27	0.77	0.81	0.28	0.78	0.25
S1090001	121990	0.75	0.40	3.39	2.85	0.67	1.37	0.34
S1090148	121990	0.69	0.33	1.95	1.65	0.44	1.24	0.30
S1100001	121990	1.31	0.39	2.07	1.74	0.49	2.47	0.37
S1103654	121990	0.79	0.42	3.62	3.07	0.66	1.45	0.35
S1108490	121990	1.36	0.79	5.20	4.98	0.98	2.38	0.82

GALENA CREEK PRELIMINARY ASSESSMENT
SOIL/MINE WASTE XRF INDEX AND PREDICTED METAL CONCENTRATIONS
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SAMPLE	DATE	AS PREDICTED	CU PREDICTED	FE PREDICTED	MN PREDICTED	NI PREDICTED	PB PREDICTED	ZN PREDICTED
HMW52224	121990	396	125	30587	-1199	14	6441	588
S1010001	121990	2436	1147	77063	-2833	39	43971	12254
S1010120	121990	345	123	24590	-821	10	10308	827
S1030001	121990	696	105	35129	27	10	6222	481
S1030138	121990	1192	364	35217	-1431	19	20558	3970
S1033847	121990	3744	1464	68712	-6157	75	12813	22032
S1040001	121990	1094	293	39398	-678	18	12922	2340
S1040115	122090	1592	534	35818	-2292	27	20219	6037
S1041548	122090	1397	164	45811	1524	7	2936	408
S1060004	122090	989	293	21288	-2177	3	33296	2437
S1060412	122090	197	13	21114	-173	11	2947	134
S1080001	122090	237	13	22409	-124	8	1390	172
S1083648	122090	447	222	42187	960	19	2861	1234
S1087892	122090	1946	404	48938	939	16	7659	1793
S1110001	122090	1646	368	34081	5856	15	8595	986
S1116084	122090	1047	322	74711	4833	13	2425	826
S1111081	122090	2648	575	35326	4348	21	-1086	4110
S1131236	122090	492	129	23605	75	9	19391	973
S1141230	122090	97	38	25223	139	11	3930	218
S1181236	122090	646	144	40139	1310	12	8078	528
S1161230	122090	345	142	27257	337	6	10882	941
S1192846	122090	243	133	22566	-245	10	15599	415
S1201836	122090	295	170	27932	132	9	11445	1313
S1231830	122090	347	147	59802	4810	11	1546	133
S1250114	122090	746	150	26019	-25	19	8388	1378
S1251436	122090	1093	167	26757	-150	2	19098	1226
S1260001	122090	495	133	25629	615	8	9049	739
S1261236	122090	345	171	34313	1765	11	9733	1100
S1271236	122090	395	63	17836	-214	7	11899	889
S1281236	122090	2984	588	46572	2012	-5	51998	1937
S1290001	122090	395	112	24969	-14	3	11037	995
S1291230	122090	592	140	26156	632	-1	19845	825
S1311236	122090	646	95	20550	-50	7	8078	496
S1320001	122090	796	508	56916	3937	26	6820	3835
S1321230	122090	96	132	23845	368	12	7808	1208
S1340001	122090	844	342	47690	3056	11	14732	2709
S1340108	122090	1095	141	43585	3420	5	10767	790
S1380001	122090	348	225	43115	2325	6	827	673
S1380112	122090	98	9	19765	441	8	483	256
S1383648	122090	48	-20	10121	-945	6	471	217
S1090001	121990	497	146	52668	1247	10	2873	431
S1090148	121990	547	48	28849	-35	13	1735	265
S1100001	121990	595	95	28105	-331	13	10365	168
S1103654	121990	497	175	56340	2107	18	3447	474
S1108490	121990	1546	429	80712	4700	11	5843	3521
	AVERAGE	873	251	39269	724	13	10681	1987

APPENDIX C-2

SOILS/MINE WASTE LABORATORY, GRADATION, AND HYDROMETER DATA BASE

HUGHESVILLE SOILS/MINE WASTE LABORATORY ANALYSES
Physical Properties

Station	Type	Sample Type	Sample Date	Lab Number	Top Interval (Inches)	Bottom Interval (Inches)	Field pH (S.U.)	Electrical Conductivity (Dsiemens/m)	Sample Texture	Percent Saturation
SS-100	N	STREAM TAILS	10/16/90	109061	0	1	2.7	0.8		21.4
SS-102	N	STREAM TAILS	10/16/90	109064	0	1	3.0	2.4	LOAMY SAND	23.3
SS-105	N	STREAM TAILS	10/16/90	109067	0	1	2.9	0.5		21.1
SS-107	N	MILL TAILS	10/16/90	109070	0	1	1.6	37.3	SANDY LOAM	21.6
SS-107	LD	MILL TAILS	10/16/90	109070	0	1	1.6	38.1	SANDY LOAM	22.4
SS-109	N	MILL TAILS	10/16/90	109052	0	1	1.4	45.7	SANDY LOAM	29.1
SS-110	N	MILL TAILS	10/16/90	109056	0	1	1.6	29.6	LOAM	31.8
SS-112	N	MILL TAILS	10/16/90	109059	0	1	1.6	30.0	CLAY LOAM	35.4
SS-115	N	WASTE ROCK	10/17/90	109032	0	1	2.2	3.2	LOAMY SAND	23.7
SS-117	N	WASTE ROCK	10/17/90	109034	0	1	2.2	4.5	SANDY LOAM	25.9
SS-124	N	WASTE ROCK	10/17/90	109040	0	1	2.1	2.7	SANDY LOAM	28.9
SS-124	LD	WASTE ROCK	10/17/90	109040	0	1	2.1	2.6		30.1
SS-130	N	WASTE ROCK	10/18/90	109043	0	1	2.6	0.2	SANDY LOAM	30.0
SS-133	N	STREAM TAILS	10/18/90	109045	0	1	2.0	4.0	SANDY LOAM	25.0
SS-135	N	WASTE ROCK	10/18/90	109048	0	1	1.9	4.1	LOAMY SAND	25.5
SS-137	N	WASTE ROCK	10/15/90	109102	0	1	5.3	4.7	SANDY LOAM	25.7
SS-150	BFS	STANDARD	11/19/90	109283	0					
SS-160	BFS	STANDARD	11/19/90	109284	0					
SS-100	N	STREAM TAILS	10/16/90	109062	1	15	2.6	0.9		32.7
SS-105	N	STREAM TAILS	10/16/90	109068	1	6	2.5	0.4		28.1
SS-107	N	MILL TAILS	10/16/90	109071	1	60	1.6	25.9	LOAMY SAND	23.5
SS-109	N	MILL TAILS	10/16/90	109053	1	48	1.6	35.6	LOAMY SAND	24.9
SS-124	N	WASTE ROCK	10/17/90	109041	1	12	1.9	4.5	LOAMY SAND	24.0
SS-137	N	WASTE ROCK	10/15/90	109103	1	24	4.6	11.0	SANDY LOAM	31.0
SS-133	N	STREAM TAILS	10/18/90	109046	3	24	2.2	0.8	SANDY LOAM	34.9
SS-105	N	SOIL	10/16/90	109069	6	12	1.8	3.4		37.4
SS-102	N	STREAM TAILS	10/16/90	109065	8	48	4.1	3.2	SAND	30.3
SS-134	N	SOIL	10/18/90	109047	10	22	2.3	1.3		24.4
SS-115	N	WASTE ROCK	10/17/90	109033	12	36	2.1	4.7	SANDY LOAM	27.4
SS-124	N	WASTE ROCK	10/17/90	109042	12	40	2.1	1.6	LOAMY SAND	27.6
SS-130	N	WASTE ROCK	10/18/90	109044	12	30	2.0	2.7	SANDY LOAM	35.1

NOTES: 1) Sample types are defined as: BFS - blind field standard, D - field duplicate, LD - lab duplicate, N - natural, XCB - cross-contamination blank.
2) Data-quality analysis codes are defined as: A - blind field standard outside advisory range, C - cross-contamination blank equal to or above detection limit, N - laboratory spike outside control limits, R - field duplicates outside expected range, U - less than detection limit, Z - value not useable for statistics.
3) Blanks indicate values not determined.

HUGHESVILLE SOILS/MILL WASTE LABORATORY ANALYSES
Physical Properties

Station	Type	Sample Type	Sample Date	Lab Number	Top Interval (Inches)	Bottom Interval (Inches)	Field pH (S.U.)	Electrical Conductivity (Dsiemens/mm)	Sample Texture	Percent Saturation
SS-135	N	WASTE ROCK	10/18/90	109049	15	36	1.8	6.3	SANDY LOAM	27.4
SS-135	D	WASTE ROCK	10/18/90	109050	15	36	1.9	5.4		27.9
SS-135	LD	WASTE ROCK	10/18/90	109050	15	36	1.9	5.3		29.9
SS-100	N	SOIL	10/16/90	109063	18	26	3.2	0.6		30.1
SS-117	N	WASTE ROCK	10/17/90	109035	18	36	2.4	3.4	SANDY LOAM	37.6
SS-121	N	WASTE ROCK	10/17/90	109037	18	36	2.1	4.8		33.4
SS-121	D	WASTE ROCK	10/17/90	109038	18	36	2.0	5.7		37.8
SS-137	N	WASTE ROCK	10/15/90	109104	24	48	1.6	1.7	SANDY LOAM	32.8
SS-110	N	MILL TAILS	10/16/90	109057	36	54	1.6	44.0	LOAMY SAND	24.0
SS-117	N	WASTE ROCK	10/17/90	109036	36	48	2.2	4.0	SANDY LOAM	34.3
SS-102	N	STREAM TAILS	10/16/90	109066	40	60	4.0	0.5	LOAMY SAND	36.7
SS-109	N	MILL TAILS	10/16/90	109054	48	66	1.8	20.7	LOAMY SAND	23.0
SS-107	N	MILL TAILS	10/16/90	109051	66	72	1.6	14.4		38.1
SS-109	N	MILL TAILS	10/16/90	109055	66	132	1.7	20.1	SANDY LOAM	23.9
SS-110	N	MILL TAILS	10/16/90	109058	84	90	4.0	27.0	SILT LOAM	35.8
HMW5	N	WASTE ROCK	11/07/90	109105	120	132	2.6	6.7		24.6
SS-112	N	MILL TAILS	10/17/90	109039	156	178	1.5	29.4	SILT LOAM	75.2
SS-112	N	SOIL	10/16/90	109060	216	222	1.6	20.1	SANDY LOAM	33.2
SS-112	LD	SOIL	10/16/90	109060	216	222	1.8	28.6		33.4
HMW5	N	WASTE ROCK	11/07/90	109106	360	384	1.8	11.5		23.7

NOTES:
1) Sample types are defined as: BFS - blind field standard, D - field duplicate, LD - lab duplicate, N - natural, XCB - cross-contamination blank.
2) Data-quality analysis codes are defined as: A - blind field standard outside advisory range, C - cross-contamination blank equal to or above detection limit, N - laboratory spike outside control limits, R - field duplicates outside expected range, U - less than detection limit, Z - value not useable for statistics.
3) Blanks indicate values not determined.

HUGHESVILLE SOILS/MINE WASTE [illegible]
Total and Saturated Paste [illegible] Data

Station	Type	Sample Type	Sample Date	Top Interval (Inches)	Bottom Interval (Inches)	Aluminum Total (mg/kg)	Aluminum Extract (mg/l)	Arsenic Total (mg/kg)		Arsenic Extract (mg/l)		Cadmium Total (mg/kg)	Cadmium Extract (mg/l)
SS-100	N	STREAM TAILS	10/16/90	0	1	2410	2.0	920	A	0.072		23.0	0.655
SS-102	N	STREAM TAILS	10/16/90	0	1	2510	0.5	610	A	0.053		9.0	0.061
SS-105	N	STREAM TAILS	10/16/90	0	1	1610	0.9	690	A	0.021		12.0	0.272
SS-107	N	MILL TAILS	10/16/90	0	1	1610	1050.0	540	A	20.000		13.0	4.920
SS-107	LD	MILL TAILS	10/16/90	0	1	1620	1090.0	520	A	180.000		13.0	4.830
SS-109	N	MILL TAILS	10/16/90	0	1				A				
SS-110	N	MILL TAILS	10/16/90	0	1				A				
SS-112	N	MILL TAILS	10/16/90	0	1	5600	1370.0	920	A	380.000		15.0	9.100
SS-115	N	WASTE ROCK	10/17/90	0	1	2290		720	A			7.4	
SS-117	N	WASTE ROCK	10/17/90	0	1	3910	11.0	299	A	0.021		8.1	0.075
SS-124	N	WASTE ROCK	10/17/90	0	1	3220	58.0	365	A	0.180		17.2	0.330
SS-124	LD	WASTE ROCK	10/17/90	0	1	2980	58.0	388	A	0.140		17.0	0.255
SS-130	N	WASTE ROCK	10/18/90	0	1	2390	[illegible]	510	A	0.010		14.0	0.013
SS-133	N	STREAM TAILS	10/18/90	0	1	1830	[illegible]	2010	A	0.092		44.0	1.520
SS-135	N	WASTE ROCK	10/18/90	0	1	2000	[illegible]	220	A	0.354		9.2	0.200
SS-137	N	WASTE ROCK	10/15/90	0	1	4400		270	A			37.0	
SS-150	BFS	STANDARD	11/19/90	0		33600		70				42.7	
SS-160	BFS	STANDARD	11/19/90	0		13300		73				42.7	
SS-100	N	STREAM TAILS	10/16/90	1	18	5160	[illegible]	2030	A	0.040		17.0	0.474
SS-105	N	STREAM TAILS	10/16/90	1	6	3290		1050	A			12.0	
SS-107	N	MILL TAILS	10/16/90	1	66	[illegible]	[illegible]	730	A	22.000		22.0	2.370
SS-109	N	MILL TAILS	10/16/90	1	48				A				
SS-124	N	WASTE ROCK	10/17/90	1	12	[illegible]	37.0	311	A	0.425		7.6	0.250
SS-137	N	WASTE ROCK	10/15/90	1	24	[illegible]		490	A			28.0	
SS-133	N	STREAM TAILS	10/18/90	3	24	[illegible]		1600	A			11.0	
SS-105	N	SOIL	10/16/90	6	12	[illegible]		3910	A			25.0	
SS-102	N	STREAM TAILS	10/16/90	8	48	[illegible]	1.5	160	[illegible]	0.005	U	14.0	1.200
SS-134	N	SOIL	10/18/90	10	22	5410		697				10.0	
SS-115	N	WASTE ROCK	10/17/90	12	36	2400		324				5.9	

NOTES: 1) Sample types are defined as: BFS - blind field standard, D - field duplicate, LD - lab duplicate, N - natural, XCB - cross-contaminated blank.
2) Data-quality analysis codes are defined as: A - blind field standard outside advisory range, C - cross-contamination blank equal to or above detection limit, N - laboratory spike recovery outside control limits, R - field duplicates outside expected range, U - less than detection limit, Z - value not useable for statistics
3) Blanks indicate values not determined.

HUGHESVILLE SOIL/MINE WASTE LABORATORY ANALYSES
Total and Saturated Paste Extract Metals Data

Station	Type	Sample Type	Sample Date	Top Interval (Inches)	Bottom Interval (Inches)	Aluminum Total (mg/kg)	Aluminum Extract (mg/l)	Arsenic Total (mg/kg)	Arsenic Extract (mg/l)	Cadmium Total (mg/kg)	Cadmium Extract (mg/l)
SS-124	N	WASTE ROCK	10/17/90	12	40	2410	2.1	[illegible] A	0.023	4.4	0.024
SS-130	N	WASTE ROCK	10/18/90	12	30	2360		310 A		16.0	
SS-135	N	WASTE ROCK	10/18/90	15	36	2090	30.0	116 A	0.407	10.0	0.698
SS-135	D	WASTE ROCK	10/18/90	15	36	3150	16.0	110 A	0.341	12.0	0.606
SS-135	LD	WASTE ROCK	10/18/90	15	36	3190	16.0	161 A	0.253	14.0	0.596
SS-100	N	SOIL	10/16/90	18	26	13700		3 A		9.0	
SS-117	N	WASTE ROCK	10/17/90	18	36	2620	59.0	312 A	0.040	8.3	0.388
SS-121	N	WASTE ROCK	10/17/90	18	36	3910	71.0	457 A	0.110	8.4	0.339
SS-121	D	WASTE ROCK	10/17/90	18	36	4370	78.0	1030 A	0.400	9.9	0.236
SS-137	N	WASTE ROCK	10/15/90	24	48	1810		670 A		25.0	
SS-110	N	MILL TAILS	10/16/90	36	54			A			
SS-117	N	WASTE ROCK	10/17/90	36	48	2360	29.0	312 A	0.076	11.3	0.346
SS-102	N	STREAM TAILS	10/16/90	48	60	9110		16 A		20.0	
SS-109	N	MILL TAILS	10/16/90	48	66	1820	250.0	690 A	13 000	27.0	1.680
SS-107	N	MILL TAILS	10/16/90	66	72	6470		500 A		9.7	
SS-109	N	MILL TAILS	10/16/90	66	132	2230	190.0	2110 A	370.000	68.0	3.710
SS-110	N	MILL TAILS	10/16/90	84	90			A			
HMWS	N	WASTE ROCK	11/07/90	120	132	4040		560 A		18.8	
SS-112	N	MILL TAILS	10/17/90	156	178	5550	1000.0	1580 A	500.000	17.1	9.900
SS-112	N	SOIL	10/16/90	216	222	10700	1150.0	660 A	200.000	12.0	5.800
SS-112	LD	SOIL	10/16/90	216	222	10800	1200.0	640 A	200.000	12.0	5.500
HMWS	N	WASTE ROCK	11/07/90	360	384	3410		340 A		9.7	

NOTES: 1) Sample types are defined as: BFS - blind field standard, D - field duplicate, LD - lab duplicate, N - natural, XCB - cross-contamination blank.

2) Data-quality analysis codes are defined as: A - blind field standard outside advisory range, C - cross-contamination blank equal to or above detection limit, N - laboratory spike recovery outside control limits, R - field duplicates outside expected range, U - less than detection limit, Z - value not useable for statistics.

3) Blanks indicate values not determined.

HUGHSVILLE SOILS/MINE WASTE [illegible]
Total and Saturated Paste [illegible]

Station	Type	Sample Type	Sample Date	Top Interval (Inches)	Bottom Interval (Inches)	Chromium Total (mg/kg)		Chromium Extract (mg/l)		[illegible]	Copper Extract (mg/l)	Iron Total (mg/kg)	Iron Extract (mg/l)
SS-100	N	STREAM TAILS	10/16/90	0	1	2	U	0.02	U	[illegible]	0.54	23200	7.20
SS-102	N	STREAM TAILS	10/16/90	0	1	2	U	0.02	U	[illegible]	0.29	22900	0.57
SS-105	N	STREAM TAILS	10/16/90	0	1	2	U	0.01		[illegible]	0.32	26100	1.30
SS-107	N	MILL TAILS	10/16/90	0	1	2	U	0.20	U	[illegible]	44.00	44200	30700.00
SS-107	LD	MILL TAILS	10/16/90	0	1	2	U	0.20	U	[illegible]	43.00	43400	31100.00
SS-109	N	MILL TAILS	10/16/90	0	1								
SS-110	N	MILL TAILS	10/16/90	0	1								
SS-112	N	MILL TAILS	10/16/90	0	1	4		7.00		[illegible]	116.00	50400	43800.00
SS-115	N	WASTE ROCK	10/17/90	0	1	3						30700	
SS-117	N	WASTE ROCK	10/17/90	0	1	2		0.88		[illegible]	0.66	29100	8.00
SS-124	N	WASTE ROCK	10/17/90	0	1	4		0.15			0.80	27300	45.00
SS-124	LD	WASTE ROCK	10/17/90	0	1	3		0.70			0.55	25900	43.00
SS-130	N	WASTE ROCK	10/18/90	0	1	2	U	0.02	U	[illegible]	0.12	33300	0.41
SS-133	N	STREAM TAILS	10/18/90	0	1	34		0.04		[illegible]	3.65	65400	120.00
SS-135	N	WASTE ROCK	10/18/90	0	1	2	U	0.04		[illegible]	0.71	17400	220.00
SS-137	N	WASTE ROCK	10/15/90	0	1	28				[illegible]		134000	
SS-150	BFS	STANDARD	11/19/90	0		50				[illegible]		19500	
SS-160	BFS	STANDARD	11/19/90	0		51				[illegible]		19800	
SS-100	N	STREAM TAILS	10/16/90	1	18	10		0.02		[illegible]	1.00	60000	9.60
SS-105	N	STREAM TAILS	10/16/90	1	6	2	U			[illegible]		34400	
SS-107	N	MILL TAILS	10/16/90	1	66	2	U	[illegible]	U	[illegible]	18.00	78400	9850.00
SS-109	N	MILL TAILS	10/16/90	1	48								
SS-124	N	WASTE ROCK	10/17/90	1	12	2	U	0.10	U	31	0.85	16600	181.00
SS-137	N	WASTE ROCK	10/15/90	1	24	28				[illegible]		121000	
SS-133	N	STREAM TAILS	10/18/90	3	24	4				206		25200	
SS-105	N	SOIL	10/16/90	6	12	12				580		73600	
SS-102	N	STREAM TAILS	10/16/90	8	48	14		0.12		208	1.20	37300	0.19
SS-134	N	SOIL	10/18/90	10	22	10				36		37000	
SS-115	N	WASTE ROCK	10/17/90	12	36	2				76		27500	

NOTES: 1) Sample types are defined as: BFS - blind field standard, D - field duplicate, LD - lab duplicate, N - natural, XCB - cross-contamination blank.
2) Data-quality analysis codes are defined as: A - blind field standard outside advisory range, C - cross-contamination blank equal to or above detection limit, N - laboratory spike recovery outside control limits, R - field duplicates outside expected range, U - less than detection limit, Z - value not useable for statistics.
3) Blanks indicate values not determined.

HUGHESVILLE SOILS/MINE WASTE LABORATORY ANALYSES
Total and Saturated Paste Extract Metals Data

Station	Type	Sample Type	Sample Date	Top Interval (Inches)	Bottom Interval (Inches)	Chromium Total (mg/Kg)		Chromium Extract (mg/l)	Copper Total (mg/Kg)	Copper Extract (mg/l)	Iron Total (mg/kg)	Iron Extract (mg/l)
SS-124	N	WASTE ROCK	10/17/90	12	40	2	U	0.02	11	0.19	15700	5.80
SS-130	N	WASTE ROCK	10/18/90	12	30	2	U		172		40100	
SS-135	N	WASTE ROCK	10/18/90	15	36	2	U	0.05	129	2.22	15400	490.00
SS-135	D	WASTE ROCK	10/18/90	15	36	2	U	0.04	158	1.49	17900	350.00
SS-135	LD	WASTE ROCK	10/18/90	15	36	2	U	0.05	160	1.59	18500	360.00
SS-100	N	SOIL	10/16/90	18	26	47			167		23500	
SS-117	N	WASTE ROCK	10/17/90	18	36	4		0.05	93	2.12	29300	9.70
SS-121	N	WASTE ROCK	10/17/90	18	36	6		0.12	32	1.60	41100	82.00
SS-121	D	WASTE ROCK	10/17/90	18	36	7		0.05	37	2.10	54900	230.00
SS-137	N	WASTE ROCK	10/15/90	24	48	7			645		148000	
SS-110	N	MILL TAILS	10/16/90	36	54							
SS-117	N	WASTE ROCK	10/17/90	36	48	3		0.04	111	1.01	39600	47.00
SS-102	N	STREAM TAILS	10/16/90	48	60	20			369		12300	
SS-109	N	MILL TAILS	10/16/90	48	66	2	U	0.06	157	21.00	91500	4900.00
SS-107	N	MILL TAILS	10/16/90	66	72	7			79		27300	
SS-109	N	MILL TAILS	10/16/90	66	132	2	U	1.53	688	290.00	141000	8100.00
SS-110	N	MILL TAILS	10/16/90	84	90							
HMW5	N	WASTE ROCK	11/07/90	120	132	7			116		37800	
SS-112	N	MILL TAILS	10/17/90	156	178	10		4.00	314	305.00	81000	48200.00
SS-112	N	SOIL	10/16/90	216	222	14		3.23	190	150.00	32800	16400.00 U
SS-112	LD	SOIL	10/16/90	216	222	14		3.15	190	110.00	33900	14700.00
HMW5	N	WASTE ROCK	11/07/90	360	384	7			55		39700	

NOTES: 1) Sample types are defined as: BFS - blind field standard, D - field duplicate, LD - lab duplicate, N - natural, XCB - cross-contamination blank.

2) Data-quality analysis codes are defined as: A - blind field standard outside advisory range, C - cross-contamination blank equal to or above detection limit, N - laboratory spike recovery outside control limits, R - field duplicates outside expected range, U - less than detection limit, Z - value not useable for statistics.

3) Blanks indicate values not determined.

HUGHESVILLE SOILS/MINE WASTE LABORATORY ANALYSES
Total and Saturated Paste Extract Metals Data

Station	Type	Sample Type	Sample Date	Top Interval (Inches)	Bottom Interval (Inches)	Lead Total (mg/kg)	Lead Extract (mg/l)	Manganese Total (mg/kg)	Manganese Extract (mg/l)	Mercury Total (mg/kg)	Mercury Extract (mg/l)	
SS-100	N	STREAM TAILS	10/16/90	0	1	13500	2.57	28	3.00	0.72	0.002	U
SS-102	N	STREAM TAILS	10/16/90	0	1	6130	0.13	53	0.35	0.27	0.013	
SS-105	N	STREAM TAILS	10/16/90	0	1	12200	5.90	26	1.79	0.62	0.002	U
SS-107	N	MILL TAILS	10/16/90	0	1	4340	2.44	26	3.11	0.35	0.002	U
SS-107	LD	MILL TAILS	10/16/90	0	1	4000	2.46	18	3.47	0.36	0.002	U
SS-109	N	MILL TAILS	10/16/90	0	1							
SS-110	N	MILL TAILS	10/16/90	0	1							
SS-112	N	MILL TAILS	10/16/90	0	1	10600	10.47	1630	6100.00	0.42	0.002	U
SS-115	N	WASTE ROCK	10/17/90	0	1	11100		38		0.20		
SS-117	N	WASTE ROCK	10/17/90	0	1	10200	4.32	16	2.08	0.66	0.004	
SS-124	N	WASTE ROCK	10/17/90	0	1	34600	3.40	39	17.00	0.52	0.002	U
SS-124	LD	WASTE ROCK	10/17/90	0	1	40700	3.50	36	15.00	0.52	0.002	U
SS-130	N	WASTE ROCK	10/18/90	0	1	34000	5.50	29	0.12	2.80	0.011	
SS-133	N	STREAM TAILS	10/18/90	0	1	18600	1.17	63	1.90	2.10	0.004	U
SS-135	N	WASTE ROCK	10/18/90	0	1	22000	3.03	13	1.46	0.51	0.002	U
SS-137	N	WASTE ROCK	10/15/90	0	1	8690		15000		0.07		
SS-150	BFS	STANDARD	11/19/90	0		32		350		1.20		
SS-160	BFS	STANDARD	11/19/90	0		30		350		1.40		
SS-100	N	STREAM TAILS	10/16/90	1	18	6340	0.16	180	2.20	0.36	0.045	
SS-105	N	STREAM TAILS	10/16/90	1	6	18500		76		0.85		
SS-107	N	MILL TAILS	10/16/90	1	66	2310	3.66	6	1.90	0.45	0.004	
SS-109	N	MILL TAILS	10/16/90	1	48							
SS-124	N	WASTE ROCK	10/17/90	1	12	3270	2.70	9	5.05	0.20	0.002	U
SS-137	N	WASTE ROCK	10/15/90	1	24	1740		5100		0.27		
SS-133	N	STREAM TAILS	10/18/90	3	24	18000		40		1.30		
SS-105	N	SOIL	10/16/90	6	12	1540		10900		0.24		
SS-102	N	STREAM TAILS	10/16/90	8	48	451	0.29	1340	58.00	0.05	0.003	
SS-134	N	SOIL	10/18/90	10	22	1030		1410		0.07		
SS-115	N	WASTE ROCK	10/17/90	12	36	4050		45		0.44		

NOTES: 1) Sample types are defined as: BFS - blind field standard, D - field duplicate, LD - lab duplicate, N - natural, XCB - cross-contamination blank.

2) Data-quality analysis codes are defined as: A - blind field standard outside advisory range, C - cross-contamination blank equal to or above detection limit, N - laboratory spike recovery outside control limits, R - field duplicates outside expected range, U - less than detection limit, Z - value not useable for statistics.

3) Blanks indicate values not determined.

HUGHESVILLE SOILS/MINE WASTE [illegible]
Total and Saturated Paste Ext[illegible] Data

Station	Type	Sample Type	Sample Date	Top Interval (Inches)	Bottom Interval (Inches)	Lead Total (mg/kg)	Lead Extract (mg/l)		[illegible] Total (mg/kg)	Manganese Extract (mg/l)	Mercury Total (mg/kg)	Mercury Extract (mg/l)	
SS-124	N	WASTE ROCK	10/17/90	12	40	291	0.17		6	0.68	0.44	0.002	U
SS-130	N	WASTE ROCK	10/18/90	12	30	9170			36		1.80		
SS-135	N	WASTE ROCK	10/18/90	15	36	12200	2.55		31	17.00	1.60	0.002	U
SS-135	D	WASTE ROCK	10/18/90	15	36	22800	2.55		28	7.30	1.90	0.003	
SS-135	LD	WASTE ROCK	10/18/90	15	36	22800	2.81		29	7.40	1.80	0.002	
SS-100	N	SOIL	10/16/90	18	26	91			121		0.07		
SS-117	N	WASTE ROCK	10/17/90	18	36	23600	2.43		34	3.58	1.40	0.002	U
SS-121	N	WASTE ROCK	10/17/90	18	36	4210	2.07		26	2.64	0.59	0.002	
SS-121	D	WASTE ROCK	10/17/90	18	36	9360	1.13		29	3.13	0.73	5.020	
SS-137	N	WASTE ROCK	10/15/90	24	48	4100			2040		0.32		
SS-110	N	MILL TAILS	10/16/90	36	54								
SS-117	N	WASTE ROCK	10/17/90	36	48	24600	2.26		11	3.73	1.30	0.002	U
SS-102	N	STREAM TAILS	10/16/90	48	60	408			91		0.08		
SS-109	N	MILL TAILS	10/16/90	48	66	2070	2.92		67	280.00	0.44	0.002	U
SS-107	N	MILL TAILS	10/16/90	66	72	2810			10		0.20		
SS-109	N	MILL TAILS	10/16/90	66	132	4460	8.00		115	420.00	0.94	0.002	U
SS-110	N	MILL TAILS	10/16/90	84	90								
IWW5	N	WASTE ROCK	11/07/90	120	132	11500			216		0.64		
SS-112	N	MILL TAILS	10/17/90	156	178	10000	2.10		5200	8700.00	1.00	1.250	
SS-112	N	SOIL	10/16/90	216	222	720	0.20	U	1600	5100.00	0.10	0.020	U
SS-112	LD	SOIL	10/16/90	216	222	680	0.53		1410	4850.00	0.10	0.020	U
IWW5	N	WASTE ROCK	11/07/90	360	384	1490			49		0.26		

NOTES: 1) Sample types are defined as: BFS - blind field standard, D - field duplicate, LD - lab duplicate, N - natural, XCB - cross-contamination blank.
2) Data-quality analysis codes are defined as: A - blind field standard outside advisory range, C - cross-contamination blank equal to or above detection limit, N - laboratory spike recovery outside control limits, R - field duplicates outside expected range, U - less than detection limit, Z - value not useable for statistics.
3) Blanks indicate values not determined.

HUGHESVILLE SOILS/MINE WASTE LABORATORY ANALYSES
Total and Saturated Paste Extract Metals Data

Station	Type	Sample Type	Sample Date	Top Interval (Inches)	Bottom Interval (Inches)	Nickel Total (mg/kg)		Nickel Extract (mg/l)		[illegible]	Silver Extract (mg/l)		Zinc Total (mg/kg)	Zinc Extract (mg/l)
SS-100	N	STREAM TAILS	10/16/90	0	1	13.0	A	0.02	U	150	0.02	U	3010	96.00
SS-102	N	STREAM TAILS	10/16/90	0	1	10.0	A	0.02	U	43	0.02	U	553	8.80
SS-105	N	STREAM TAILS	10/16/90	0	1	11.0	A	0.02	U	229	0.02		1450	38.00
SS-107	N	MILL TAILS	10/16/90	0	1	14.0	A	3.98		169	0.24		636	130.00
SS-107	LD	MILL TAILS	10/16/90	0	1	16.0	A	4.17		166	0.25		588	130.00
SS-109	N	MILL TAILS	10/16/90	0	1									
SS-110	N	MILL TAILS	10/16/90	0	1									
SS-112	N	MILL TAILS	10/16/90	0	1	14.0		5.71		72	0.84		731	1050.00
SS-115	N	WASTE ROCK	10/17/90	0	1	5.0	A			25			314	2.20
SS-117	N	WASTE ROCK	10/17/90	0	1	3.0	A	0.06		56	0.02	U	453	11.00
SS-124	N	WASTE ROCK	10/17/90	0	1	5.0	A	0.15		101	0.10	U	2010	42.00
SS-124	LD	WASTE ROCK	10/17/90	0	1	5.0	A	0.25		167	0.10	U	2150	42.00
SS-130	N	WASTE ROCK	10/18/90	0	1	8.0		0.01		176	0.02	U	792	2.16
SS-133	N	STREAM TAILS	10/18/90	0	1	17.0		0.15		110	0.02	U	4830	245.00
SS-135	N	WASTE ROCK	10/18/90	0	1	13.0		0.13		13	0.02	U	388	24.00
SS-137	N	WASTE ROCK	10/15/90	0	1	42.0				132			1580	
SS-150	BFS	STANDARD	11/19/90	0		120.0				76			350	
SS-160	BFS	STANDARD	11/19/90	0		130.0				63			360	
SS-100	N	STREAM TAILS	10/16/90	1	18	28.0	A	0.02	U	66	0.02	U	630	64.00
SS-105	N	STREAM TAILS	10/16/90	1	6	12.0	A			156			1090	
SS-107	N	MILL TAILS	10/16/90	1	66	22.0	A	1.45		113	0.26		950	140.00
SS-109	N	MILL TAILS	10/16/90	1	48									
SS-124	N	WASTE ROCK	10/17/90	1	12	6.0	A	0.10		39	0.10	U	262	35.00
SS-137	N	WASTE ROCK	10/15/90	1	24	30.0				33			613	
SS-133	N	STREAM TAILS	10/18/90	3	24	10.0				176			558	
SS-105	N	SOIL	10/16/90	6	12	27.0	A			16			1070	
SS-102	N	STREAM TAILS	10/16/90	8	48	24.0	A	0.19		9	0.03		1220	401.00
SS-134	N	SOIL	10/18/90	10	22	16.0				[illegible]			249	
SS-115	N	WASTE ROCK	10/17/90	12	36	6.0	A			[illegible]			130	

NOTES: 1) Sample types are defined as: BFS - blind field standard, D - field duplicate, LD - lab duplicate, N - natural, XCB - cross contamination blank.

2) Data-quality analysis codes are defined as: A - blind field standard outside advisory range, C - cross-contamination blank equal to or above detection limit, N - laboratory spike recovery outside control limits, R - field duplicates outside expected range, U - less than detection limit, Z - value not useable for statistics.

3) Blanks indicate values not determined.

HUGHESVILLE SOILS/MINE WASTE [illegible]
Total and Saturated Paste [illegible]

Station	Type	Sample Type	Sample Date	Top Interval (inches)	Bottom Interval (inches)	Nickel Total (mg/kg)		[illegible]		[illegible]		Silver Extract (mg/l)		Zinc Total (mg/kg)	Zinc Extract (mg/l)
SS-124	N	WASTE ROCK	10/17/90	12	40	8.0	A	0.02		[illegible]		0.02	U	78	3.88
SS-130	N	WASTE ROCK	10/18/90	12	30	10.0				[illegible]				626	
SS-135	N	WASTE ROCK	10/18/90	15	36	8.0		0.21		[illegible]		0.02	U	1000	98.00
SS-135	D	WASTE ROCK	10/18/90	15	36	10.0		0.15		115		0.02	U	1680	80.00
SS-135	LD	WASTE ROCK	10/18/90	15	36	10.0		0.16		106		0.02	U	2000	82.00
SS-100	N	SOIL	10/16/90	18	26	37.0	A	[illegible]		2	U			478	
SS-117	N	WASTE ROCK	10/17/90	18	36	7.0	A	0.02	U	56		0.02	U	340	54.00
SS-121	N	WASTE ROCK	10/17/90	18	36	4.0	A	0.05		26		0.11		313	34.00
SS-121	D	WASTE ROCK	10/17/90	18	36	8.0	A	0.02	U	21		0.02		184	38.00
SS-137	N	WASTE ROCK	10/15/90	24	48	22.0				52				503	
SS-110	N	MILL TAILS	10/16/90	36	54										
SS-117	N	WASTE ROCK	10/17/90	36	48	9.7	A	0.07		71		0.02		975	66.00
SS-102	N	STREAM TAILS	10/16/90	48	60	22.0	A			2				858	
SS-109	N	MILL TAILS	10/16/90	48	66	22.0		1.34		68		0.14		905	100.00
SS-107	N	MILL TAILS	10/16/90	66	72	12.0	A			19				562	
SS-109	N	MILL TAILS	10/16/90	66	132	38.0		2.23		113		0.30		76	390.00
SS-110	N	MILL TAILS	10/16/90	84	90										
IMWS	N	WASTE ROCK	11/07/90	120	132	8.9	A			63				2800	
SS-112	N	MILL TAILS	10/17/90	156	178	13.0		[illegible]		54		1.25		860	930.00
SS-112	N	SOIL	10/16/90	216	222	18.0		[illegible]		6		0.89		321	660.00
SS-112	LD	SOIL	10/16/90	216	222	21.0		[illegible]		6		0.84		321	550.00
IMW5	N	WASTE ROCK	11/07/90	360	384	9.0	A			8				204	

NOTES: 1) Sample types are defined as: BFS - blind field standard, D - field duplicate, LD - lab duplicate, N - natural, SCB - cross-contamination blank.
2) Data-quality analysis codes are defined as: A - blind field standard outside advisory range, C - cross contamination blank equal to or above detection limit, N - laboratory spike recovery outside control limits, R - field duplicates outside expected range, U - less than detection limit, Z - value not usable for statistics
3) Blanks indicate values not determined.

HUGHESVILLE SOILS/MINE WASTE LABORATORY RESULTS
Sulfur Fractionation

Station	Type	Sample Type	Sample Date	Top Interval	Bottom Interval	Total Sulfur (%)	Sulfate Sulfur (%)	Jarosite Sulfur (%)	Pyritic Sulfur (%)	Residual Sulfur (%)
SS-100	N	STREAM TAILS	10/16/90	0	1					
SS-102	N	STREAM TAILS	10/16/90	0	1					
SS-105	N	STREAM TAILS	10/16/90	0	1					
SS-107	N	MILL TAILS	10/16/90	0	1	3.82	0.73	0.45	1.39	1.25
SS-107	LD	MILL TAILS	10/16/90	0	1	3.83	0.71	0.45	1.21	1.46
SS-109	N	MILL TAILS	10/16/90	0	1					
SS-110	N	MILL TAILS	10/16/90	0	1					
SS-112	N	MILL TAILS	10/16/90	0	1					
SS-115	N	WASTE ROCK	10/17/90	0	1					
SS-117	N	WASTE ROCK	10/17/90	0	1					
SS-124	N	WASTE ROCK	10/17/90	0	1					
SS-124	LD	WASTE ROCK	10/17/90	0	1					
SS-130	N	WASTE ROCK	10/18/90	0	1					
SS-133	N	STREAM TAILS	10/18/90	0	1					
SS-135	N	WASTE ROCK	10/18/90	0	1					
SS-137	N	WASTE ROCK	10/15/90	0	1					
SS-150	BFS	STANDARD	11/19/90	0						
SS-160	BFS	STANDARD	11/19/90	0						
SS-100	N	STREAM TAILS	10/16/90	1	18					
SS-105	N	STREAM TAILS	10/16/90	1	6					
SS-107	N	MILL TAILS	10/16/90	1	66	8.96	0.38	0.29	5.65	2.64
SS-109	N	MILL TAILS	10/16/90	1	48					
SS-124	N	WASTE ROCK	10/17/90	1	12					
SS-137	N	WASTE ROCK	10/15/90	1	24	5.81	1.41	1.41	1.44	1.55
SS-133	N	STREAM TAILS	10/18/90	3	24					
SS-105	N	SOIL	10/16/90	6	12					
SS-102	N	STREAM TAILS	10/16/90	8	48	0.37	0.16	0.02	0.20	0.01
SS-134	N	SOIL	10/18/90	10	22					
SS-115	N	WASTE ROCK	10/17/90	12	36	0.97	0.68	0.09	0.11	0.09

NOTES: 1) Sample types are defined as: BFS - blind field standard, D - field duplicate, LD - lab duplicate, N - natural, Scb - cross-contamination blank.
2) Data-quality analysis codes are defined as: A - blind field standard outside advisory range, C - cross contamination blank equal to or above detection limit, N - laboratory spike recovery outside control limits, R - field duplicates outside expected range, U - less than detection limit [illegible] value not useable for statistics.
3) Blanks indicate values not determined.

[illegible]SVILLE SOILS/[illegible] WASTE [illegible]
Sulfur Fractions

Station	Type	Sample Type	Sample Date	Top Interval	Bottom Interval	Total Sulfur (%)	[illegible] (%)		Pyritic Sulfur (%)	Residual Sulfur (%)
SS-124	N	WASTE ROCK	10/17/90	12	40	1.58	1.07		0.39	0.00
SS-130	N	WASTE ROCK	10/18/90	12	30					
SS-135	N	WASTE ROCK	10/18/90	15	36					
SS-135	D	WASTE ROCK	10/18/90	15	36					
SS-135	LD	WASTE ROCK	10/18/90	15	36					
SS-100	N	SOIL	10/16/90	18	26	1.32	0.87	0.10	0.10	0.34
SS-117	N	WASTE ROCK	10/17/90	18	36					
SS-121	N	WASTE ROCK	10/17/90	18	36					
SS-121	D	WASTE ROCK	10/17/90	18	36	5.21	1.59	1.68	0.91	0.83
SS-137	N	WASTE ROCK	10/15/90	24	48	9.53	0.13	0.48	7.58	1.34
SS-110	N	MILL TAILS	10/16/90	36	54	2.29	[illegible]	0.53	0.30	0.34
SS-117	N	WASTE ROCK	10/17/90	36	48	0.13	0.01	0.07	0.06	0.01
SS-102	N	STREAM TAILS	10/16/90	48	60					
SS-109	N	MILL TAILS	10/16/90	48	66					
SS-107	N	MILL TAILS	10/16/90	66	72					
SS-109	N	MILL TAILS	10/16/90	66	132	9.45	0.32	0.91	6.30	1.92
SS-110	N	MILL TAILS	10/16/90	84	90					
IHW5	N	WASTE ROCK	11/07/90	120	132	6.22	1.20	1.74	2.30	0.98
SS-112	N	MILL TAILS	10/17/90	156	178					
SS-112	N	SOIL	10/16/90	216	222					
SS-112	LD	SOIL	10/16/90	216	222					
IHW5	N	WASTE ROCK	11/07/90	360	384					

NOTES:
1) Sample types are defined as: BFS - blind field standard, D - field duplicate, LD - lab duplicate, N - natural, XCB - cross-contamination blank.
2) Data-quality analysis codes are defined as: A - blind field standard outside advisory range, C - cross-contamination blank equal to or above detection limit, N - laboratory spike recovery outside control limits, R - field duplicates outside expected range, U - less than detection limit, Z - value not useable for statistics.
3) Blanks indicate values not determined.

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

BLOCK P TAILINGS
PA NO. 07-090

AIMSS SCORESHEET

SITE NAME: BLOCK P TAILINGS
PA NUMBER: 07-090

LINE NO.				
		GROUNDWATER PATHWAY		
1		OBSERVED RELEASE		300
2		EXCEEDENCES		100
3A	GW - LIKELIHOOD OF RELEASE	CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	800
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	1729.500
6		WELLS - 1 MI. x 2.5		2.5
7	GW - TARGETS	WELLS - 1 TO 4 MI		20
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	22.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	31131000
		SURFACE WATER PATHWAY		
11		OBSERVED RELEASE		300
12	SW - LIKELIHOOD OF RELEASE	EXCEEDENCES		100
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	800
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	1876.835
16		DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19	SW - TARGETS	FISHERY		0
20		RECREATION		5
21		IRRIGATION/STOCK		0
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	15
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	22522020
		AIR PATHWAY		
25		OBSERVED RELEASE		0
26A	AIR - LIKELIHOOD OF RELEASE	CONTAINMENT		20
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	100
27		LIKELIHOOD SCORE	LINES 25 + 26C	100
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	6.256
29		POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		0
31	AIR - TARGETS	WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	30
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	18768
		DIRECT CONTACT PATHWAY		
36		OBSERVED EXPOSURE		50
37A	LIKELIHOOD OF EXPOSURE	ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	150
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	5.765
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		10
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 THRU 42	10
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	8648
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE**	(LINES 10 + 24 + 35 + 44) / 100,000		**536.80**

			SITE NAME:	BLOCK P TAILINGS
			PA NUMBER:	07-090
LINE NO.		SITE SAFETY		
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	0
9		POPULATION - 1 MILE		10
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 THRU 11	10
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**0.00**

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: GALENA CREEK SAMPLING **PA#:** 07-090

Date: June 7, 1993 **Time:** 0830

Field Team Leader: Bullock/Babits; Pioneer

Sampling Personnel: Flammang, Lasher, Clark;
Pioneer
Pierson; TD&H

Visitors: None

Weather/Seasonality Observations: Rainy; cold (35°F); breezy. It rained during the previous night and through the entire sampling investigation.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #1: 425' upgradient from confluence with Belt Creek and Galena Creek (SW-2 and SE-2 sample locations); #2: At foot of NE SE S7, SW-4 and SE-4 sample locations; #3: Unnamed creek from Edwards and Wright mines, 60 feet above confluence with Galena Creek (SW-6 and SE-6 sample locations; #4: Below Block P Tailings on Galena Creek, SW-8 and SE-8 sample locations; #5: Green Creek 610' above confluence with Galena Creek, SW-10 and SE-10 sample locations; #7: SW-1 location downgradient of Block P Tailings; #8: Upgradient of Block P Tailings, SW-3 and SE-3 sample locations; #9: Below Marcelline Mine, SW-5 and SE-5 sample locations; #10: Upstream from Marcelline Mine, downgradient of Belt Patent site (SW-7 and SE-7 sample locations); #11: Galena Creek above Block P Mine, approx. 20' above old wier (SW-9 and SE-9 sample locations); #12: Daisy Creek above confluence with Green Creek approx. 100', SW-11 and SE-11 sample locations.
Video Tape No. 1 has the individual sites.

General Comments/Observations (not covered specifically in attached Inventory Forms): Sampling of Galena Creek was done based on sample locations from the previous sampling done by Chen-Northern. No samples were taken during the individual site investigations for mines located on Galena Creek in order to sample them all during this one event.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Isolate sources from the drainages.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): GALENA CREEK SAMPLING PA#: 07-090

Legal Description: T _____;R_____;Sec._______,___1/4___1/4___1/4

County: JUDITH BASIN Mining District: HUGHESVILLE

Latitude: N 47° 03' to 47° 05' Longitude: W 110° 38' to 110° 38'

Primary Drainage Basin and Code: Dry Fork Belt Creek/10030105
Secondary Drainage Basin: Galena Creek

USGS Quadrangle map name(s): Barker

Mine Type/Commodities: N/A
Activity Status: Active___,Inactive/Exploration___,Abandoned___.

Ownership status: Known YX N__; private/public? Private/Public
Owner, Agent or Contact(Include address and phone when available): Please see individual site investigation files; USFS

Relationship to other mines/sites in the area/district: Galena Creek flows past Block P Mine and Tailings, Belt Patent, Marcelline, NW SE S7, and Danny T Mine. Creeks draining from the Wright, Edwards, Harrison, Moulton, and Tiger mines flow into Galena Creek.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? Some reclamation at Block P Mine by DNRC is failing. Monitoring wells are present in drainage. Some reclamation at Belt Patent. The Hughesville district is listed under CECRA.

General site features: Elevation 5480'-5840', Slope < 5°,
Aspect Galena Creek flows south.

Land use: Mining___, Recreational X, Residential___, Urban___,
Agricultural___, Other(Specify)__________

Area of disturbed/unvegetated lands?__________acres.
Dimensions:__________

Predominant vegetation types: Douglas fir/spruce forest

Access: roads - good X,poor___,4wd___,trail___.
Other logistical considerations (proximity to other sites). Galena Creek Road runs next to the creek all the way to the locked gate on the Daisy Creek turnoff.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There is 1 well log within a 1 mile radius of the creek.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Galena Creek above Barker flows on shallow amounts of alluvium. Depth of alluvium increases in the lower part of the drainage. Green Creek and Daisy Creek meet and form Galena Creek approx. 2.5 miles above Dry Fork Belt Creek. Galena Creek flows south-southwest to the confluence. The entire area is underlain by Barker porphyry.

Mining/milling history, ore type/tenor, host rock, gangue: Ore deposits are lenses in Barker porphyry along a contact between porphyritic syenite and porphyritic granite. Gangue minerals are generally quartz and calcite. Ore minerals are galena, colvellite, polybasite, tetrahedrite, and quartz.

Mine Operation?

Shafts - Yes___, No X , # _____, Comment N/A
Adits - Yes___, No X , # _____, Comment
Pits - Yes___, No X , # _____, Comment
Placers - Yes___, No X , # _____, Comment
Other - Yes___, No X , # _____, Comment

Mill Operation? Yes____, No X . If yes answer the next three questions:

Period(s) of Operation: N/A

Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN$^-$ leach (vat, heap), floatation, smelting?
N/A

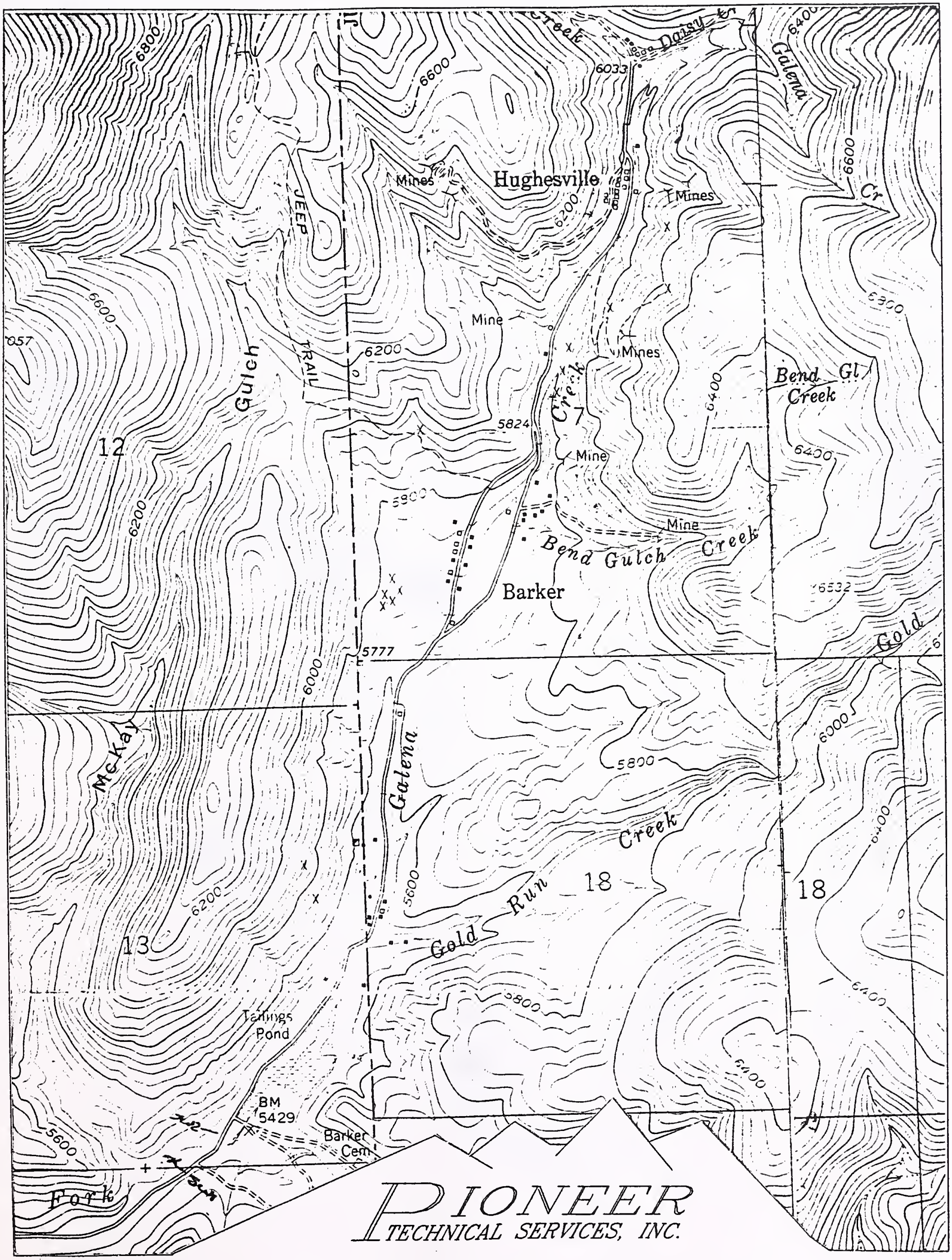
Montana Bureau of Mines and Geology
Water Well Log Data

05/12/1993

Well No.: M:1996
Location: 16N 09E 04 BACB
Site Name: MALMBERG, SWEDE*13 MI W SURPRISE CK COLONY
County: Judith Basin
Depth: 320.0
Yield: 6.0
Static Water Level: 171.11
Pumping Water Level: 220.0
Year drilled: 1978
Driller: THATCHER DRILLING
Driller's License: 305
DNRC Well No.: 19819

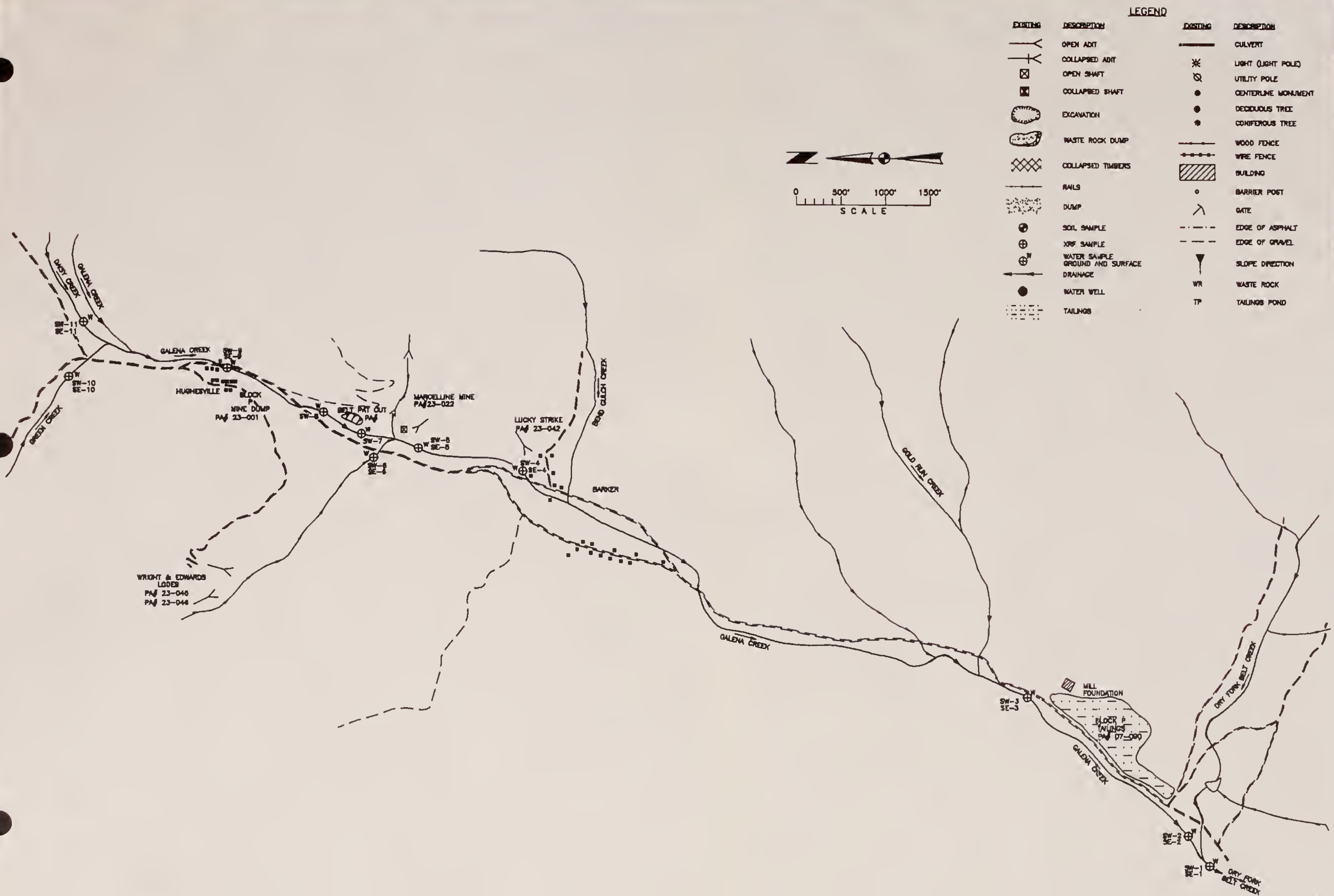
Well No.: M:28095
Location: 16N 09E 04 BBDA
Site Name: MALMBERG SWEDE
County: Judith Basin
Depth: 441.0
Yield: 3.0
Static Water Level: 377.00
Pumping Water Level: 280.0
Year drilled: 1976
Driller: THATCHER DRILLING
Driller's License: 086
DNRC Well No.:

Well No.: M:28096
Location: 16N 09E 07 ADCB ←
Site Name: BODNER MIKE
County: Judith Basin
Depth: 70.0
Yield: 26.0
Static Water Level: 0.00
Pumping Water Level: 24.0
Year drilled: 1958
Driller:
Driller's License:
DNRC Well No.:



PIONEER
TECHNICAL SERVICES, INC.

GALENA CREEK SAMPLING, P.A. NO. 07-090



LEGEND

EXISTING	DESCRIPTION	EXISTING	DESCRIPTION
—<	OPEN ADIT	▬	CULVERT
—+<	COLLAPSED ADIT	✳	LIGHT (LIGHT POLE)
⊠	OPEN SHAFT	⌀	UTILITY POLE
⧓	COLLAPSED SHAFT	●	CENTERLINE MONUMENT
⬭	EXCAVATION	●	DECIDUOUS TREE
⬭	WASTE ROCK DUMP	✱	CONIFEROUS TREE
⨯⨯⨯	COLLAPSED TIMBERS	—•—•—	WOOD FENCE
—+—+—	RAILS	-•-•-•-	WIRE FENCE
⁘	DUMP	▨	BUILDING
◕	SOIL SAMPLE	∘	BARRIER POST
⊕	XRF SAMPLE	⋀	GATE
⊕W	WATER SAMPLE GROUND AND SURFACE	—·—·—	EDGE OF ASPHALT
←—•—	DRAINAGE	— — —	EDGE OF GRAVEL
●	WATER WELL	▼	SLOPE DIRECTION
∴	TAILINGS	WR	WASTE ROCK
		TP	TAILINGS POND

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

GALENA CREEK SAMPLE LOCATIONS
HUGHESVILLE DISTRICT JUDITH BASIN COUNTY

PIONEER
TECHNICAL SERVICES, INC. BUTTE, MT.

TDH

DRAWN MWC DATE 10/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

SHEET NO.

GALENA.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: ______________________

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)[*]	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
N/A									

[*] D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: ______________________

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes X , No___, Number: 4 Identification: One at NE SE S7 (23-042); one at Danny T Mine; one at Block P; one at unnamed mine between NE SE S7 and Marcelline (23-022)

Filled shafts: Yes X , No____, Number: 2 Identification: One at Marcelline; possibly one at Block P Mine

Seeps/Springs: Yes___, No X , Number:____ Identification:____________

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 21

Distance to nearest well used for drinking? At Barker between SW-3 and SW-4

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable X , Possible____, Unlikely____.
Mine opening discharges are contaminated. Waste rock and tailings with elevated metals levels are in contact with water.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X , No ___, Name(s): Galena Creek, Daisy Creek, Green Creek, Dry Fork Belt Creek, Bend Gulch Creek, Gold Rush Creek, and unnamed tributary

Dry streambeds: Yes ____, No X , Name(s):

Other surface water: Yes X , No ___, Name(s)/Description: Drainage from several mines

Waste materials within any floodplain: Yes X , No ___ Source ID(s): Waste rock from Marcelline, Belt Patent, Block P Mine, and unidentified mine; Tailings from Block P Tailings (large amounts) and Belt Patent

Approximate Flood frequency? X 1 yr, ___10 yr, ___100 yr

Estimated seasonal flow of stream(s) (cfs)? 6 during investigation
High Flow: 30 cfs , Average Flow: 3 cfs

Distance between waste source(s) and nearest surface water body (ft)? 0 feet

Surface water draining onto or through waste sources: Yes X , No ____, Describe: Adit discharges; runoff; Galena Creek cuts waste rock at Marcelline; undercutting waste rock at Block P Mine

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?) Dry Fork Belt Creek has fishery, wetlands, stock watering and possible irrigation. Above confluence with Galena Creek, Dry Fork Belt Creek is reported to contain cutthroat trout (sensitive species).

Observed erosional/sedimentation/stream turbidity problems? Yes X , No ____, Distance downstream (ft)? 1000+ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): Turbidity from Galena Creek can be seen in Dry Fork Belt Creek below the confluence for at least 1,000 feet. Galena Creek is discolored (iron-stained) of its length and particularly turbid near and below Block P Mine.

SURFACE WATER INVENTORY FORM

SAMPLERS: Bullock, Babits, Flammang, Pierson, Lasher, Clark*

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	In Dry Fork Belt Creek below confluence with Galena Creek	6.65	410	145	5.4	63	45.66 cfs (M)	07-090-SW-1	06/07/93 0830	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-1	SE	In Dry Fork Belt Creek below confluence with Galena Creek	N/A	N/A	N/A	N/A	N/A	N/A	07-090-SE-1	06/07/93 0830	T-Metals
SW-2	SW	Before confluence with Dry Fork Belt Creek in Galena Creek approx. 425 feet	6.8	290	249.9	6.3	27	9.67 cfs (M)	07-090-SW-2	06/07/93 0915	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3, CN-
SE-2	SE	Before confluence with Dry Fork Belt Creek in Galena Creek approx. 425 feet	N/A	N/A	N/A	N/A	N/A	N/A	07-090-SE-2	06/07/93 1015	T-Metals
SW-3	SW	Upgradient of Block P Tailings, below confluence with Gold Rush Creek	6.62	371	442	6.2	29	9.81 cfs (M)	07-090-SW-3	06/07/93 0945	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3, CN-
SE-3	SE	Upgradient of Block P Tailings, below confluence with Gold Rush Creek	N/A	N/A	N/A	N/A	N/A	N/A	07-090-SE-3	06/07/93 1015	T-Metals
SW-4	SW	Below NE SE S7 Mine, above town of Barker on Galena Creek	6.20	410	372.3	6.4	1	5.25 cfs (M)	07-090-SW-4	06/07/93 1015	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-4	SE	Below NE SE S7 Mine, above town of Barker on Galena Creek	N/A	N/A	N/A	N/A	N/A	N/A	07-090-SE-2	06/07/93 1015	T-Metals
SW-5	SW	Below Marcelline Mine on Galena Creek, upgradient of NE SE S7 Mine	4.54	564	615	5.5	1	2.42 cfs (M)	07-090-SW-5	06/07/93 1015	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-5	SE	Below Marcelline Mine on Galena Creek, upgradient of NE SE S7 Mine	N/A	N/A	N/A	N/A	N/A	N/A	07-090-SE-5	06/07/93 1015	T-Metals
SW-6	SW	Confluence with creek draining Edwards and Wright Lode, 60 feet above confluence with Galena Creek	7.15	190	405	6.7	30	0.73 cfs (M)	23-046-SW-6	06/07/93 1045	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): *Continued on next page

SURFACE WATER INVENTORY FORM (Cont'd)

SAMPLERS: Bullock, Babits, Flammang, Pierson, Lasher, Clark

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SE-6	SE	Confluence with creek draining Edwards and Wright Lode, 60 feet above confluence with Galena Creek	N/A	N/A	N/A	N/A	N/A	N/A	23-046-SE-6	06/07/93 1045	T-Metals
SW-7	SW	Upstream from Marcelline, down from Belt Patent Mine	4.87	580	116	5.7	1	2.25 cfs (M)	07-090-SW-7	06/07/93 1105	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-7	SE	Upstream from Marcelline, down from Belt Patent Mine	N/A	N/A	N/A	N/A	N/A	N/A	07-090-SE-7	06/07/93 1105	T-Metals
SW-8	SW	Upstream of Belt Patent Mine, downstream from Block P Mine	6.81	100	131.6	5.7	3	3.98 cfs (M)	07-090-SW-8	06/07/93 1115	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-8	SE	Upstream of Belt Patent Mine, downstream from Block P Mine	N/A	N/A	N/A	N/A	N/A	N/A	07-090-SE-8	06/07/93 1145	T-Metals
SW-9	SW	Galena creek above Block P Mine, approx. 20 feet above Old Wier	7.2	364	480	4.8	1	3.405 cfs (M)	07-090-SW-9	06/07/93 1145	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-9	SE	Galena creek above Block P Mine, approx. 20 feet above Old Wier	N/A	N/A	N/A	N/A	N/A	N/A	07-090-SE-9	06/07/93 1145	T-Metals
SW-10	SW	Green Creek before confluence with Galena Creek approx. 610 feet	6.81	220	87.4	5.7	61	0.54 cfs (M)	07-090-SW-10	06/07/93 1145	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-10	SE	Green Creek before confluence with Galena Creek approx. 610 feet	N/A	N/A	N/A	N/A	N/A	N/A	07-090-SE-10	06/07/93 1145	T-Metals
SW-11	SW	Daisy Creek (Galena Creek) before confluence with Green Creek	7.16	480	522	4.8	25	2.39 cfs (M)	07-090-SW-10	06/07/93 1145	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-11	SE	Daisy Creek (Galena Creek) before confluence with Green Creek	N/A	N/A	N/A	N/A	N/A	N/A	07-090-SE-11	06/07/93 1145	T-Metals

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 400+ acres

Wetlands present: Yes X , No___, Describe: Streamside in Dry Fork Belt Creek

Carbonate rocks/soils: Yes X , No____, Describe: Small amount of calcite present in gangue.

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X ; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments___

Nearest residence(ft or miles)? Flows through the town of Barker

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: __________

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
N/A						

Notes and Clarifications: __________

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_, Describe:________

Population within 1 mile: 1-10___; 10-30_X_; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments________

Evidence of recreational use on site: Yes_X_, No___, Describe:________

Accessibility - Fences, warning signs, closed roads? Unrestricted

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment________
Wilderness Area - Yes___, No_X_, Comment________
T&E Species Habitat - Yes___, No_X_, Comment________
Bat Habitat - Yes___, No_X_, Comment________

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High___, Medium_X_, Low___
Wetlands Frontage - High___, Medium___, Low_X_
Fisheries Habitat and Species Classification - _6_
Sport Fishery Classification - _6_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number____, types and locations: See site specific inventory forms.

Hazardous structures: Yes_X_, No___, Number____, types and locations: See site specific inventory forms.

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____, types and locations:________

Unstable waste piles, impoundments, undercut banks: Yes_X_, No____, Number____, types and locations: See site specific inventory forms.

Fire and/or Explosion hazards: Yes___, No_X_, Explain:________

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDHES/SHWB, Superfund Basics, Overview and Accomplishments of Superfund in Montana 1983-1993, November 1993.

MDSL/AMRB, Hughesville/Barker Mining District, Galena Creek Drainage Preliminary Assessment Project Report, Prepared by Chen-Northern, Inc., March 1991.

USEPA, First Annual Report - Hughesville Acid Mine Demonstration Project; EPA Grant S-803822, Prepared by Montana Department Natural Resources and Conservation, June 1, 1975 through June 1, 1976.

USGS, Topographic Map, Barker, Montana, 7 1/2 minute Quadrangle, 1961.

LABORATORY ANALYTICAL DATA

GALENA CREEK
PA NO. 07-090

Galena Creek PA# 07-090
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BULLOCK
INVESTIGATION DATE: 06/07/93

SOLID MATRIX ANALYSES

Metals in soils Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	Cyanide (mg/Kg)
07-090-SE-1	396	486	9.4 J	7.7 J	8.5	182 J	51700	0.147 J	3120 J	25 J	705	5 U	1590 J	NR
07-090-SE-2	140	97.3	13.2 J	7 J	3.9	149 J	21600	0.037 J	2720 J	18 J	1070	3 U	2080 J	0.31 U
07-090-SE-3	196	123	11.1 J	7.6 J	2.8	149 J	26700	0.045 J	4030 J	23 J	1110	4 U	1970 J	0.57
07-090-SE-4	272	147	3.6 J	3.2 J	5.1	107 J	45900	0.097 J	651 J	6 J	1590	4 U	811 J	NR
07-090-SE-5	368	213	0.7 U	6.7 J	4.7	146 J	56400	0.214 J	975 J	9 J	1410	5 U	566 J	NR
23-046-SE-6	379	220	2.3 J	11.9 J	7.3	139 J	66400	0.275 J	1800 J	11 J	4040	5 U	562 J	NR
07-090-SE-7	154	59	0.8 J	3.6 J	3.7	106 J	25200	0.177 J	438 J	3 J	584	4 U	152 J	NR
07-090-SE-8	255	218	3 J	9 J	4.8	215 J	43700	0.161 J	2120 J	19 J	3390	5 U	749 J	NR
07-090-SE-9	43	222	2.6 J	9.4 J	3.6	243 J	21400	0.057 J	2600 J	24 J	432	5 U	632 J	NR
07-090-SE-10	28	88.8	0.6 U	4.4 J	1.8	140 J	13400	0.03 J	653 J	9 J	82	4 U	180 J	NR
07-090-SE-11	101	608	33.3 J	13.8 J	8.5	1450 J	50200	0.178 J	10100 J	78 J	6800	15	7000 J	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

WATER MATRIX ANALYSES

Metals in Water Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
07-090-SW-1	9.92	40.7	2.9	5.99 U	5 U	23.5	1390	0.038 U	790	8.78 U	6.75	36.9	632	66.2
07-090-SW-2	54.5	45.4	16.3	5.99 U	5 U	121	6040	0.038 U	3890	19.1	38.7	33	3670	105
07-090-SW-3	16.8	45.2	15.5	5.99 U	5 U	100	4360	0.038 U	3640	18.8	39	33.5	3440	97.4
07-090-SW-4	38.8	22.7	36.5	9.03	5 U	246	11600	0.038 U	8670	43.4	121	53.8	7750	131
07-090-SW-5	38.7	23	34.4	8.73	5 U	256	12600	0.038 U	8940	45.9	59.6	50	7980	135
23-046-SW-6	13.9	20.6	13.2	5.99 U	5 U	57.8	5150	0.087	869	10.9	14.5	18.3 U	2130	76.9
07-090-SW-7	33	23.7	34.7	6.77	5 U	265	12300	0.038 U	8090	39.4	68.6	50.8	7790	142
07-090-SW-8	29	23.6	30.2	5.99 U	5 U	239	11800	0.038 U	7560	41.5	51.1	38.9	7090	137
07-090-SW-9	0.98 U	25.1	2.55 U	5.99 U	5.6	150	1370	0.038 U	558	8.78 U	37.6	32.1	585	107
07-090-SW-10	2.09	20	2.55 U	5.99 U	5.13	6.77	403	0.038 U	77.4	8.78 U	2.52	33	54.3	85.5
07-090-SW-11	0.98 U	26.5	3.9	5.99 U	5 U	234	1950	0.038 U	840	8.78 U	64	32.9	861	115

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Wet Chemistry Results in mg/l

Field I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
07-090-SW-1	72	< 5.0	23	< 0.05	NR
07-090-SW-2	190	< 5.0	106	< 0.05	0.02
07-090-SW-3	146	< 5.0	87	< 0.05	0.01
07-090-SW-4	318	< 5.0	181	0.05	NR
07-090-SW-5	308	< 5.0	182	0.06	NR
23-046-SW-6	141	< 5.0	60	< 0.05	NR
07-090-SW-7	320	< 5.0	185	0.07	NR
07-090-SW-8	274	< 5.0	178	0.06	NR
07-090-SW-9	182	< 5.0	86	0.07	NR
07-090-SW-10	130	< 5.0	35	0.05	NR
07-090-SW-11	218	< 5.0	113	< 0.05	NR

LEGEND

07-090-SE-1	Dry Fork of Belt Ck. downstream of confluence with of Galena Ck.	07-090-SW-1	Same as SE-1
07-090-SE-2	Galena Ck. upstream of confluence , downstream of Block P Tails	07-090-SW-2	Same as SE-2
07-090-SE-3	Galena Ck. upstream of Block P Tails,downstream of Lucky Strike	07-090-SW-3	Same as SE-3
07-090-SE-4	Galena CK. upstream of the Lucky Strike	07-090-SW-4	Same as SE-4
07-090-SE-5	Galena Ck. downstream of the Marcelline	07-090-SW-5	Same as SE-5
23-046-SE-6	Unnamed trib. to Galena Ck. @ the Marcelline	23-046-SW-6	Same as SE-6
07-090-SE-7	Galena Ck. upstream of the Marcelline, downstream of Belt Patent	07-090-SW-7	Same as SE-7
07-090-SE-8	Galena Ck. upstream of the Belt Patent, downstream of Block P	07-090-SW-8	Same as SE-8
07-090-SE-9	Galena Ck. upstream of the Block P Mine	07-090-SW-9	Same as SE-9
07-090-SE-10	Green Creek	07-090-SW-10	Same as SE-10
07-090-SE-11	Daisy Creek	07-090-SW-11	Same as SE-11

SUMMARY OF HISTORICAL ANALYTICAL DATA
FROM OTHER SOURCES

MDSL AMRB/PIONEER 4/9/93

WATER QUALITY

GALENA CREEK AT LOWER WEIR DF-1

(MG/L)

DATE	07-01-75	07-15-75	08-19-75	10-06-75	11-03-75	12-09-75	01-29-76	02-26-76	03-30-76
ZINC (TOT)	5.	10.	14.	12.	10.	15.	14.	13.	11.
IRON (TOT)	2.6	20.	9.5	12.	9.3	9.5	8.	7.5	7.
COPPER (TOT)	.04	.16	.21	.28	.25	.37	.33	.28	.25
LEAD (TOT)	.05	.05	.25	.16	.12	.16	.17	.15	.15
MANGANESE	---	5.	18.	13.	10.	13.	14.	13.	11.
CONDUCTIVITY	343	403.	490.	621.	453.	534.2	529	538.	479.
FLOW (M^3/s)	---	---	.229	.113	.048	.023	.017	.014	.021

WATER QUALITY

SILVER CREEK AT ROAD ABOVE MOUTH DF-2

(MG/L)

DATE	07-01-75	07-15-75	08-19-75	10-06-75	11-03-75	12-09-75	01-29-76	02-26-76	03-30-76
ZINC (TOT)	4.5	2.5	3.8	8.	5.3	5.	5.4	5.4	11.
IRON (TOT)	10.	3.6	5.5	11.	18.	8.	6.6	6.0	12.
COPPER (TOT)	.08	.09	.10	.18	.16	.09	.11	.11	.22
LEAD (TOT)	.06	.12	.19	.07	.07	.10	.17	.05	.12
MANGANESE	---	.86	2.5	5.0	3.3	3.35	4.2	4.3	7.5
CONDUCTIVITY	160	195	244.	410.	258.	272.6	298.	323.	521.
FLOW (L/S)	19.3	3.39	1.13	.795	1.83	1.13	.566	.945	.567

WATER QUALITY

LIBERTY MINE SEEP AT GALENA CREEK DF-3

DATE	07-01-75	07-15-75	08-19-75	10-06-75	11-03-75	12-09-75	01-29-76	02-26-76	03-30-76
				(MG/L)					
ZINC(TOT)	60.	76.	95.	104.	125.	NO FLOW	NO FLOW	NO FLOW	NO FLOW
IRON(TOT)	66.	74.	98.	103.	72.				
COPPER(TOT)	1.5	1.5	4.2	2.8	2.2				
LEAD(TOT)	1.0	.12	.20	.18	.08				
MANGANESE	---	106.	183.	190.	200.				
CONDUCTIVITY	1587.	1937.	2397	2460	2377				
FLOW(L/S)	1.69	.378	.113	.088	.111				

WATER QUALITY

GALENA CREEK JUST BELOW MINE DUMP DF-4

DATE	07-01-75	07-15-75	08-19-75	10-06-75	11-03-75	12-09-75	01-29-76	02-26-76	03-30-76
				(MG/L)					
ZINC (TOT)	13.	12.	80.	93.	96.	156.	115.	100.	100.
IRON (TOT)	28.	11.	155.	190.	170.	222.	165.	145.	150.
COPPER (TOT)	.31	.37	3.4	3.8	2.8	6.	4.	3.1	2.8
LEAD (TOT)	.15	.05	.33	.30	.25	.30	.32	.32	.32
MANGANESE	---	8.	75.	103.	97.	137.	110.	100.	100.
CONDUCTIVITY	577.	550.	2202.	2330.	2480.	2777.6	2548.	2491.	2555.
FLOW (L/S)	99.1	14.2	7.36	2.54	2.32	2.68	.946	2.84	1.136

WATER QUALITY

SPRING ALONG GALENA CREEK IN MIDDLE OF MINE CARS DF-5

(MG/L)

DATE	07-01-75	09-19-75	10-06-75
ZINC (TOT)	8.	64.	149.
IRON (TOT)	32.	124.	296.
COPPER (TOT)	.28	2.5	4.5
LEAD (TOT)	.38	.33	.53
MANGANESE	---	72.	135.
CONDUCTIVITY	425.	1995.	3150.
FLOW (L/S)	---	---	----

WATER QUALITY

BUBBLING SPRING AT BLOCK P MINE DF-6

DATE	07-01-75	07-15-75	08-19-75	10-06-75	11-03-75	12-09-75	01-29-76	02-26-76	03-30-76
				(MG/L)					
ZINC (TOT)	14	78.	64.	60.	51.				
IRON (TOT)	52.	280.	250.	284.	215.				
COPPER (TOT)	.32	1.5	1.3	.23	.34				
LEAD (TOT)	.32	.12	.12	.28	.16	No Flow	No Flow	No Flow	No Flow
MANGANESE	---	111.	118.	130.	110.				
CONDUCTIVITY	832.	2820.	2664.	2640.	2613.				
FLOW (L/S)	28.3	3.16	1.13	.297	.063				

WATER QUALITY

GALENA CREEK AT UPPER WEIR DF-7

DATE	07-01-75	07-15-75	08-19-75	10-06-75	11-03-75	12-09-75	01-29-76	02-26-76	03-30-76
					(MG/L)				
ZINC (TOT)	.53	.51	.23	.98	.26	.35	.27	.16	.26
IRON (TOT)	1.1	3.4	.45	3.4	.27	.35	.29	.13	.46
COPPER (TOT)	.05	.05	.01	.02	.02	.01	.01	.01	.01
LEAD (TOT)	.01	.05	.05	.05	.05	.05	.05	.05	.05
MANGANESE	---	.27	.20	.20	.22	.07	.05	.07	.05
CONDUCTIVITY	216.	278.	325.	342.	321.	321.9	322.	335.	324
FLOW (M^3/S)	.085	.022	.010	.013	.018	.012	.006	.007	.007

TABLE 3-1
DESCRIPTION OF SURFACE WATER SAMPLING SITES; GALENA CREEK PRELIMINARY ASSESSMENT

STATION NUMBER	WATER QUALITY SAMPLING POINTS
DF-01	Galena Creek at Lower Weir
DF-02	Silver Creek at Mouth
DF-03	Danny T Mine Seep at Galena Creek
DF-04	Galena Creek just below Mine Dump
DF-05A[(a)]	Galena Creek at Mine Dump Face
DF-05	Galena Creek above spring at Mine Cars
DF-06A[(a)]	Galena Creek at Bubbling Spring at Block P Mine
DF-07	Galena Creek at Upper Weir
DF-08	Galena Creek near Harrison Mine above Green Creek Input
DF-14	Green Creek above Mouth at Galena Creek
DF-21	Galena Creek above Belt Creek Confluence
DF-22	Belt Creek at Mouth
DF-40	Galena Creek above Smoke-in-Hole Creek Confluence
DF-45	Queen of the Hills at Portal (also known as DF-16)
DF-46	Galena Creek below the Block P Dump at Streamside Tailings
DF-47	Galena Creek West of Road below Barker Townsite
DF-48[(a)]	Galena Creek above Bend Gulch Creek
DF-49	Carter Mine at Portal

(a) Gaging station only

field standards. Sample train paperwork including chain-of-custody forms and analysis request forms were shipped with natural and quality control samples to Chen-Northern's analytical laboratory in Billings, Montana.

3.2 CHANGES TO THE PROJECT SAMPLING AND ANALYSIS PLAN

Only one change to the project sampling and analysis plan (Chen-Northern, 1990b) resulted from completion of the surface water sampling work task. Sampling station DF-6 was not sampled or gaged as planned because no water was flowing at this site during the low flow conditions present during the October, 1990 sampling run.

Several previously undesignated gaging stations identified in the project sampling and analysis plan were assigned station numbers during the October, 1990 sampling/gaging event. These stations are shown on Figure 3-1 and included the following:

- Station DF-6A is a gaging site established during the synoptic flow measurement event along the base of the Block P dump. The station is located on the main stem of Galena Creek.

- Station DF-5A is a gaging site located approximately 75 feet upstream of station DF-5 along the base of the Bock P dump.

- Station DF-46 is a newly designated sampling and gaging station located downstream of station DF-4 and above Silver Creek (station DF-2).

- Station DF-48 is a gaging site only and is located at the Barker townsite, upstream of big Bend Creek.

- Station DF-47 is a newly designated gaging and sampling site located at the culvert below Barker.

HUGHESVILLE SURFACE WATER DATA
Cations Data

Station	Sample Type	Sample Date	Sample Time	Total Hardness as CaCo3 (mg/l)		Calcium as Ca (mg/l)		Magnesium as Mg (mg/l)		Potassium as K (mg/l)		Sodium as Na (mg/l)	
DF-01	BFS	10/17/90	1520	565		139		53		20.8		334	
DF-01	D	10/17/90	1230	253	A	70		19		1	UA	12	C
DF-01	LD	10/30/90			A	65		18		1	UA	16	C
DF-01	N	10/17/90	1220	243	A	66		19		1	UA	11	C
DF-01	XCB	10/17/90	1410	7	U	1	U	1	U	1	U	4	C
DF-02	N	10/16/90	1615	104	A	35		4		1	UA	9	C
DF-03	N	10/17/90	1000	631	A	172		49		1	UA	25	C
DF-04	BFS	10/18/90	1540	560		137		53		20.8		333	
DF-04	D	10/18/90	1340	238	A	64		19		1	UA	12	C
DF-04	N	10/16/90	1330	240	A	65		19		1	UA	12	C
DF-04	XCB	10/18/90	1450	7	U	1	U	1	U	1	U	4	C
DF-05	N	10/16/90	1045	198	A	53		16		1	UA	11	C
DF-07	N	10/16/90	1200	182	A	48		15		1	UA	3	C
DF-08	N	10/15/90	1710	187	A	52		14		1	UA	4	C
DF-14	LD	10/30/90			A	48		18			A	4	C
DF-14	N	10/15/90	1600	192	A	47		18		1	UA	3	C
DF-21	N	10/17/90	1440	204	A	57		15		1	UA	12	C
DF-22	N	10/17/90	1330	121	A	35		8		1	UA	2	C
DF-40	N	10/17/90	1535	149	A	43		10		1	UA	2	C
DF-45	N	10/15/90	1830	282	A	85		17		1	UA	16	C
DF-46	N	10/16/90	1710	261	A	70		21		1	UA	12	C
DF-47	N	10/17/90	1125	247	A	66		20		1	UA	14	C
DF-49	N	10/15/90	1500	216	A	45		25		1	UA	4	C

NOTES:
1) Sample types are defined as: BFS - blind field standard, D - field duplicate, LD - lab duplicate, N - natural, XCB - cross-contamination blank.
2) Data-quality analysis codes are defined as: A - blind field standard outside advisory range, C - cross-contamination blank equal to or above detection limit, N - laboratory spike recovery outside control limits, R - field duplicates outside expected range, U - less than detection limit, Z - value not useable for statistics.
3) Blanks indicate values not determined.

HUGHESVILLE SURFACE WATER DATA
Anions Data

Station	Sample Type	Sample Date	Sample Time	Total Alkalinity as CaCo3 (mg/l)		Bicarbonate Alkalinity as HCO3 (mg/l)		Carbonate Alkalinity as CO3 (mg/l)	Hydroxide Alkalinity as OH (mg/l)	Chloride as Cl (mg/l)		Fluoride as F (mg/l)		Nitrate + Nitrite as N (mg/l)		Sulfate as SO4 (mg/l)
DF-01	BFS	10/17/90	1520	203		248		0	0	328		15.80		4.80		340
DF-01	D	10/17/90	1230	4	C	5		0	0	1	U	0.55		0.05	U	252
DF-01	LD	10/30/90		4	C					1	U			0.05	U	
DF-01	N	10/17/90	1220	5	C	6		0	0	1	U	0.59		0.05	U	253
DF-01	XCB	10/17/90	1410	5	C	6		0	0	1	U	0.05	U	0.05	U	1
DF-02	N	10/16/90	1615	14	C	17		0	0	1	U	0.28		0.05	U	97
DF-03	N	10/17/90	1000	1	UC	1	U	0	0	1	U	1.57		0.20		1260
DF-04	BFS	10/18/90	1540	211		258		0	0	334		14.10		4.84		337
DF-04	D	10/18/90	1340	14	C	17		0	0	1	U	0.45		0.05	U	230
DF-04	N	10/16/90	1330	16	C	20		0	0	1	U	0.45		0.05	U	226
DF-04	XCB	10/18/90	1450	10	C	12		0	0	1	U	0.05	U	0.05	U	2
DF-05	N	10/16/90	1045	56	C	68		0	0	1	U	0.36		0.05	U	152
DF-07	N	10/16/90	1200	83	C	101		0	0	1	U	0.19		0.05	U	90
DF-08	N	10/15/90	1710	38	C	46		0	0	1	U	0.18		0.05	U	137
DF-14	LD	10/30/90			C							0.21		0.05	U	
DF-14	N	10/15/90	1600	122	C	149		0	0	1	U	0.21		0.05	U	57
DF-21	N	10/17/90	1440	45	C	55		0	0	1	U	0.33		0.05	U	166
DF-22	N	10/17/90	1330	107	C	131		0	0	1	U	0.07		0.05	U	7
DF-40	N	10/17/90	1535	91	C	111		0	0	1	U	0.10		0.05	U	50
DF-45	N	10/15/90	1830	71	C	87		0	0	1	U	2.15		0.09		220
DF-46	N	10/16/90	1710	6	C	7		0	0	1	U	0.53		0.05	U	266
DF-47	N	10/17/90	1125	2	C	2		0	0	1	U	0.59		0.05	U	276
DF-49	N	10/15/90	1500	141	C	172		0	0	1	U	0.30		0.05	U	60

NOTES: 1) Sample types are defined as: BFS - blind field standard, D - field duplicate, LD - lab duplicate, N - natural, XCB - cross-contamination blank.
2) Data-quality analysis codes are defined as: A - blind field standard outside advisory range, C - cross-contamination blank equal to or above detection limit, N - laboratory spike recovery outside control limits, R - field duplicies outside expected range, U - less than detection limit, Z - value not useable for statistics.
3) Blanks indicate values not determined.

HUGHESVILLE SURFACE WATER DATA

Metals Data

Station	Sample Type	Sample Date	Sample Time	Silver Total (mg/l)		Silver Dissolved (mg/l)		Zinc Total (mg/l)		Zinc Dissolved (mg/l)	
DF-01	BFS	10/17/90	1520	0.0430		0.0390		0.20		0.20	
DF-01	D	10/17/90	1230	0.0009	A	0.0001	UA	11.30		11.30	
DF-01	LD	10/30/90		0.0009	A	0.0001	UA	11.20		11.60	
DF-01	N	10/17/90	1220	0.0009	A	0.0001	UA	11.90		11.80	
DF-01	XCB	10/17/90	1410	0.0001	U	0.0001	U	0.02	U	0.02	U
DF-02	N	10/16/90	1615	0.0001	UA	0.0001	UA	2.55		2.55	
DF-03	N	10/17/90	1000	0.0003	A	0.0001	UA	65.00		65.00	
DF-04	BFS	10/18/90	1540	0.0390		0.0350		0.19		0.19	
DF-04	D	10/18/90	1340	0.0005	A	0.0001	UA	7.52		7.48	R
DF-04	N	10/16/90	1330	0.0070	A	0.0001	UA	7.44		7.35	R
DF-04	XCB	10/18/90	1450	0.0001	U	0.0001	U	0.02	U	0.02	U
DF-05	N	10/16/90	1045	0.0002	A	0.0001	UA	2.95		2.71	R
DF-07	N	10/16/90	1200	0.0001	UA	0.0001	UA	0.24		0.23	R
DF-08	N	10/15/90	1710	0.0001	UA	0.0001	UA	0.50		0.51	R
DF-14	LD	10/30/90			A		A	0.08		0.05	R
DF-14	N	10/15/90	1600	0.0004	A	0.0001	UA	0.09		0.04	R
DF-21	N	10/17/90	1440	0.0006	A	0.0001	UA	6.30		4.65	
DF-22	N	10/17/90	1330	0.0001	UA	0.0001	UA	0.05		0.02	U
DF-40	N	10/17/90	1535	0.0018	A	0.0001	UA	1.08		0.62	
DF-45	N	10/15/90	1830	0.0001	UA	0.0001	UA	2.03		1.45	R
DF-46	N	10/16/90	1710	0.0004	A	0.0001	UA	11.00		11.00	
DF-47	N	10/17/90	1125	0.0008	A	0.0001	UA	11.90		11.90	R
DF-49	N	10/15/90	1500	0.0001	UA	0.0001	UA	0.09		0.07	

NOTES:
1) Sample types are defined as: BFS - blind field standard, D - field duplicate, LD - lab duplicate, N - natural, XCB - cross-contamination blank.
2) Data-quality analysis codes are defined as: A - blind field standard outside advisory range, C - cross-contamination blank equal to or above detection limit, N - laboratory spike recovery outside control limits, R - field duplicates outside expected range, U - less than detection limit, Z - value not useable for statistics.
3) Blanks indicate values not determined.

HUGHESVILLE SURFACE WATER DATA
Metals Data

Station	Sample Type	Sample Date	Sample Time	Manganese Total (mg/l)	Manganese Dissolved (mg/l)	Mercury Total (mg/l)	Mercury Dissolved (mg/l)	Nickel Total (mg/l)	Nickel Dissolved (mg/l)	Selenium Total (mg/l)	Selenium Dissolved (mg/l)
DF-01	BFS	10/17/90	1520	0.170	0.170	0.0046	0.0046	0.380	0.380	0.087	0.087
DF-01	D	10/17/90	1230	12.100 R	12.100 CR	0.0002 U	0.0002 U	0.017	0.010	0.005 U	0.005 U
DF-01	LD	10/30/90		12.000 R	12.100 CR	0.0002 U	0.0002 U	0.016	0.008	0.005 U	0.005 U
DF-01	N	10/17/90	1220	12.400 R	12.400 CR	0.0002 U	0.0002 U	0.012	0.011	0.005 U	0.005 U
DF-01	XCB	10/17/90	1410	0.015 U	0.015 C	0.0002 U	0.0002 U	0.002 U	0.002 U	0.005 U	0.005 U
DF-02	N	10/16/90	1615	2.040 R	2.040 CR	0.0002 U	0.0002 U	0.020	0.002 U	0.005 U	0.005 U
DF-03	N	10/17/90	1000	129.000 R	128.000 CR	0.0002 U	0.0002 U	0.150	0.130	0.005 U	0.005 U
DF-04	BFS	10/18/90	1540	0.160	0.160	0.0047	0.0047	0.350	0.350	0.093	0.090
DF-04	D	10/18/90	1340	8.400 R	8.400 R	0.0002 U	0.0002 U	0.017	0.006	0.005 U	0.005 U
DF-04	N	10/16/90	1330	7.560 R	7.560 R	0.0002 U	0.0002 U	0.013	0.008	0.005 U	0.005 U
DF-04	XCB	10/18/90	1450	0.015 U	0.015 U	0.0002 U	0.0002 U	0.002 U	0.002 U	0.005 U	0.005 U
DF-05	N	10/16/90	1045	5.280 R	5.280 R	0.0002 U	0.0002 U	[illegible]	0.002	0.005 U	0.005 U
DF-07	N	10/16/90	1200	0.230 R	0.230 R	0.0002 U	0.0002 U	[illegible] U	0.002 U	0.005 U	0.005 U
DF-08	N	10/15/90	1710	0.410 R	0.410 R	0.0002 U	0.0002 U	[illegible]	0.002 U	0.005 U	0.005 U
DF-14	LD	10/30/90		0.190 R	0.180 R			0.007		0.005 U	0.005 U
DF-14	N	10/15/90	1600	0.212 R	0.173 R	0.0002 U	0.0002 U	0.004	0.002 U	0.005 U	0.005 U
DF-21	N	10/17/90	1440	7.150 R	7.150 CR	0.0002 U	0.0002 U	0.010	0.006	0.005 U	0.005 U
DF-22	N	10/17/90	1330	0.064 R	0.064 CR	0.0002 U	0.0002 U	0.002 U	0.002 U	0.005 U	0.005 U
DF-40	N	10/17/90	1535	1.990 R	1.990 CR	0.0002 U	0.0002 U	0.007	0.002 U	0.005 U	0.005 U
DF-45	N	10/15/90	1830	7.290 R	7.290 R	0.0002 U	0.0002 U	0.006	0.002	0.005 U	0.005 U
DF-46	N	10/16/90	1710	13.100 R	13.100 CR	0.0002 U	0.0002 U	0.017	0.010	0.005 U	0.005 U
DF-47	N	10/17/90	1125	13.400 R	10.600 R	0.0002 U	0.0002 U	0.016	0.006	0.005 U	0.005 U
DF-49	N	10/15/90	1500	0.314 R	0.311 CR	0.0002 U	0.0002 U	0.017	0.003	0.005 U	0.005 U

NOTES: 1) Sample types are defined as: BFS - blind field standard, D - field duplicate, LD - lab duplicate, N - natural, XCB - cross-contamination blank.
2) Data-quality analysis codes are defined as: A - blind field standard outside advisory range, C - cross-contamination blank equal to or above detection limit, N - laboratory spike recovery outside control limits, R - field duplicates outside expected range, U - less than detection limit, Z - value not usable for statistics
3) Blanks indicate values not determined.

HUGHESVILLE SURFACE WATER DATA
Metals Data

Station	Sample Type	Sample Date	Sample Time	Chromium Total (mg/l)		Chromium Dissolved (mg/l)		Copper Total (mg/l)		Copper Dissolved (mg/l)		Iron Total (mg/l)		Iron Dissolved (mg/l)		Lead Total (mg/l)		Lead Dissolved (mg/l)	
DF-01	BFS	10/17/90	1520	0.195		0.165		0.26		0.26		0.14		0.14		0.150		0.150	
DF-01	D	10/17/90	1230	0.004	AC	0.001	UA	0.21		0.06		26.20		3.85		0.210	A	0.001	UA
DF-01	LD	10/30/90		0.003	AC	0.001	A	0.20		0.06		26.50		4.20		0.215	A	0.001	UA
DF-01	N	10/17/90	1220	0.003	AC	0.001	UA	0.20		0.07		26.70		3.91		0.200	A	0.010	A
DF-01	XCB	10/17/90	1410	0.001	C	0.001	U	0.02	U	0.02	U	0.05	U	0.05	U	0.001	U	0.001	U
DF-02	N	10/16/90	1615	0.002	AC	0.001	UA	0.05		0.04		1.15		0.06		0.053	A	0.034	A
DF-03	N	10/17/90	1000	0.010	AC	0.001	UA	0.70		0.70		130.00		128.00		0.110	A	0.102	A
DF-04	BFS	10/18/90	1540	0.195		0.165		0.26		0.26		0.14		0.14		0.150		0.150	
DF-04	D	10/18/90	1340	0.002	A	0.001	UA	0.11		0.02		17.90		11.20		0.037	A	0.001	UA
DF-04	N	10/16/90	1330	0.002	A	0.001	UA	0.11		0.03		18.30		11.90		0.038	A	0.001	UA
DF-04	XCB	10/18/90	1450	0.001	U	0.001	U	0.02	U	0.02	U	0.05	U	0.05	U	0.001	U	0.001	U
DF-05	N	10/16/90	1045	0.002	A	0.001	A	0.04		0.02	U	4.61		0.98		0.029	A	0.001	UA
DF-07	N	10/16/90	1200	0.001	UA	0.001	UA	0.02	U	0.02	U	0.12		0.06		0.003	A	0.001	UA
DF-08	N	10/15/90	1710	0.001	UA	0.001	UA	0.02		0.02	U	0.17		0.05	U	0.008	A	0.001	UA
DF-14	LD	10/30/90			A		A	0.02	U	0.02	U	0.69		0.05	U		A		A
DF-14	N	10/15/90	1600	0.002	A	0.001	UA	0.02	U	0.02	U	0.78		0.05	U	0.002	A	0.001	UA
DF-21	N	10/17/90	1440	0.003	AC	0.001	UA	0.16		0.02	U	16.60		0.06		0.155	A	0.001	UA
DF-22	N	10/17/90	1330	0.001	AC	0.001	UA	0.02	U	0.02	U	0.08		0.05	U	0.001	UA	0.001	UA
DF-40	N	10/17/90	1535	0.004	AC	0.001	UA	0.04		0.02	U	2.92		0.05	U	0.014	A	0.001	UA
DF-45	N	10/15/90	1830	0.001	A	0.001	UA	0.02	U	0.02	U	4.97		0.07		0.017	A	0.001	UA
DF-46	N	10/16/90	1710	0.003	AC	0.001	UA	0.19		0.06		21.80		13.60		0.046	A	0.002	A
DF-47	N	10/17/90	1125	0.004	A	0.001	UA	0.19		0.16		24.10		7.08		0.195	A	0.043	A
DF-49	N	10/15/90	1500	0.003	AC	0.001	UA	0.02	U	0.02	U	1.79		0.05	U	0.001	UA	0.001	UA

NOTES: 1) Sample types are defined as: BFS - blind field standard, D - field duplicate, LD - lab duplicate, N - natural, XCB - cross contamination blank.

2) Data-quality analysis codes are defined as: A - blind field standard outside advisory range, C - cross-contamination blank equal to or above detection limit, N - laboratory spike recovery outside control limits, R - field duplicates outside expected range, U - less than detection limit, Z - value not useable for statistics.

3) Blanks indicate values not determined.

HUGHESVILLE SURFACE WATER DATA
Metals Data

Station	Sample Type	Sample Date	Sample Time	Aluminum Total (mg/l)		Aluminum Dissolved (mg/l)		Arsenic Total (mg/l)		Arsenic Dissolved (mg/l)		Barium Total (mg/l)		Barium Dissolved (mg/l)		Cadmium Total (mg/l)		Cadmium Dissolved (mg/l)	
DF-01	BFS	10/17/90	1520	0.3		0.3		0.120		0.100		0.1		0.2		0.1040		0.0980	
DF-01	D	10/17/90	1230	7.0	A	0.3	AR	0.028		0.002	U	0.1	UA	0.1	UA	0.0500		0.0440	[illegible]
DF-01	LD	10/30/90		6.9	A	0.3	AR	0.030		0.002	U	0.1	UA	0.1	UA	0.0520		0.0440	[illegible]
DF-01	N	10/17/90	1220	7.5	A	0.6	AR	0.027		0.002	U	0.1	UA	0.1	UA	0.0530		0.0440	[illegible]
DF-01	XCB	10/17/90	1410	0.1	U	0.1	U	0.002	U	0.002	U	0.1	U	0.1	U	0.0001	U	0.0001	U
DF-02	N	10/16/90	1615	1.4	A	0.6	AR	0.002	U	0.002	U	0.1	UA	0.1	UA	0.0141		0.0140	[illegible]
DF-03	N	10/17/90	1000	10.5	A	9.9	AR	0.026		0.022		0.1	UA	0.1	UA	0.2600		0.2600	
DF-04	BFS	10/18/90	1540	0.3		0.3		0.110		0.110		0.1		0.1		0.0980		0.0980	
DF-04	D	10/18/90	1340	4.0	AR	0.2	A	0.015		0.002	U	0.1	UA	0.1	UA	0.0320		0.0270	[illegible]
DF-04	N	10/16/90	1330	3.3	AR	0.2	A	0.017		0.002	U	0.1	UA	0.1	UA	0.0350		0.0320	[illegible]
DF-04	XCB	10/18/90	1450	0.1	U	0.1	U	0.002	U	0.002	U	0.1	U	0.1	U	0.0001	U	0.0001	U
DF-05	N	10/16/90	1045	1.1	AR	0.1	UA	0.006		0.002	U	0.1	UA	0.1	UA	0.0114		0.0082	[illegible]
DF-07	N	10/16/90	1200	0.1	AR	0.1	UA	0.002	U	0.002	U	0.1	UA	0.1	UA	0.0008		0.0008	[illegible]
DF-08	N	10/15/90	1710	0.1	AR	0.1	UA	0.002	U	0.002	U	0.1	UA	0.1	UA	0.0024		0.0019	[illegible]
DF-11	LD	10/30/90		0.1	UAR	0.1	UA					0.1	UA	0.1	UA	0.0002			
DF-11	N	10/15/90	1600	0.1	AR	0.1	UA	0.008		0.002	U	0.1	UA	0.1	UA	0.0005		0.0001	U
DF-21	N	10/17/90	1440	3.3	A	0.1	AR	0.022		0.002	U	0.1	UA	0.1	UA	0.0300		0.0200	[illegible]
DF-22	N	10/17/90	1330	0.1	UA	0.1	UAR	0.002	U	0.002	U	0.1	UA	0.1	UA	0.0001	U	0.0001	U
DF-40	N	10/17/90	1535	0.7	A	0.1	UAR	0.005		0.002	U	0.1	UA	0.1	UA	0.0068		0.0038	[illegible]
DF-45	N	10/15/90	1830	0.3	AR	0.1	UA	0.106		0.008		0.1	UA	0.1	UA	0.0125		0.0072	[illegible]
DF-46	N	10/16/90	1710	4.2	A	0.7	AR	0.002	U	0.002	U	0.1	UA	0.1	UA	0.0450		0.0440	[illegible]
DF-47	N	10/17/90	1125	4.4	AR	1.8	A	0.027		0.002	U	0.1	UA	0.1	UA	0.0500		0.0480	[illegible]
DF-49	N	10/15/90	1500	0.1	UA	0.1	UAR	0.021		0.005		0.1	UA	0.1	UA	0.0002		0.0001	U

NOTES: 1) Sample types are defined as: BFS - blind field standard, D - field duplicate, LD - lab duplicate, N - natural, XCB - cross-contamination blank.
2) Data-quality analysis codes are defined as: A - blind field standard outside advisory range, C - cross-contamination blank equal to or above detection limit, N - laboratory spike recovery outside control limits, R - field duplicates outside expected range, U - less than detection limit, Z - value not useable for statistics.
3) Blanks indicate values not determined.

HUGHESVILLE SURFACE WATER QUALITY DATA
Physical Properties

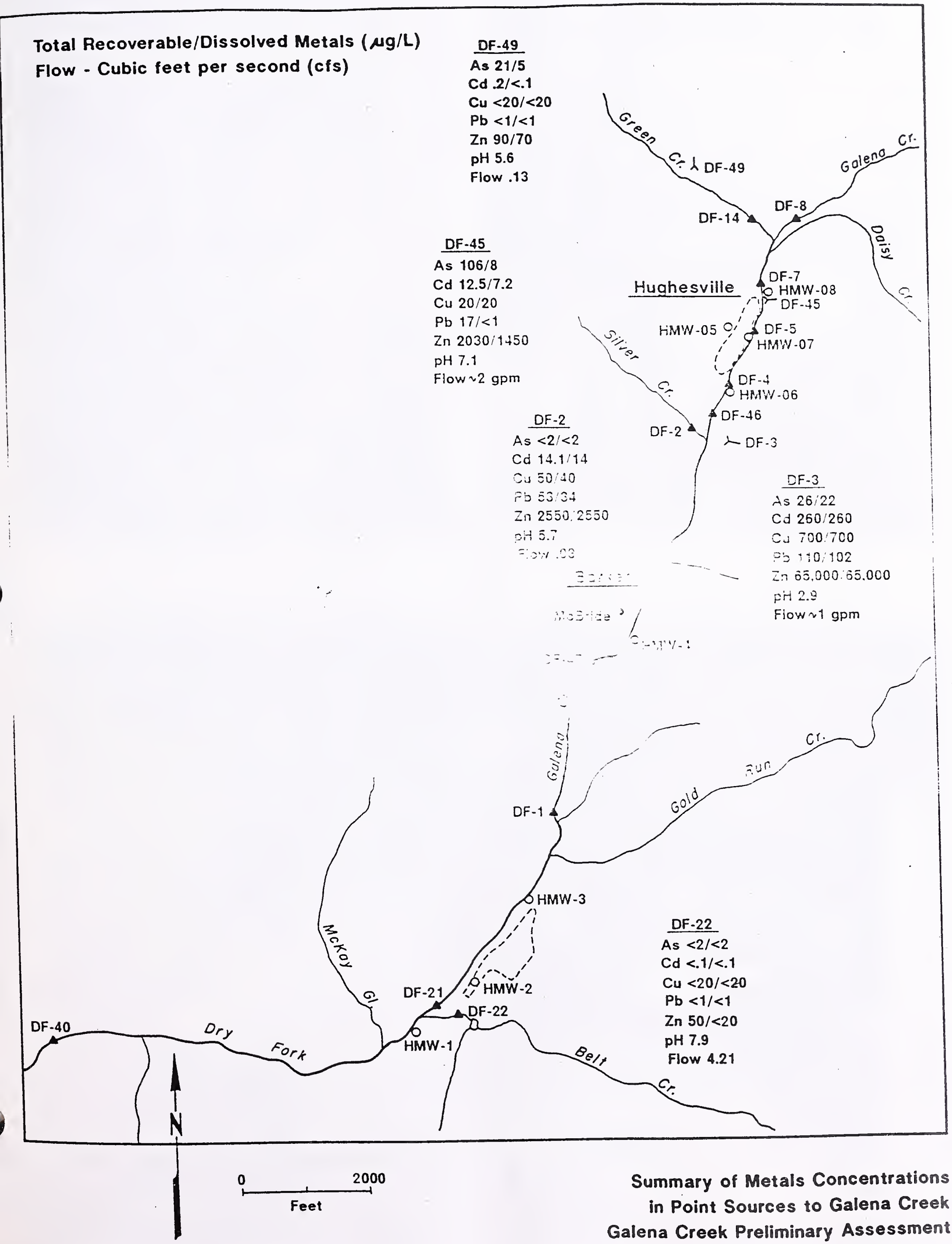
Station	Sample Type	Sample Date	Sample Time	Lab Number	Sampling Method	Water Temperature (C)	Field pH (s.u.)	[illegible]	[illegible]	Lab SC (umhos/cm)	Flow (cfs)	TDS (mg/l)		Sodium Adsorption Ratio
F-01	BFS	10/17/90	1520	108721	EDI					2100		1600		6.11
F-01	D	10/17/90	1230	108730	EDI	0.5	5.9	5.7	440	445	0.680	398	R	0.33
F-01	LD	10/30/90		108730				5.5				420	R	
F-01	N	10/17/90	1220	108731	EDI	0.5	5.9	5.7	[illegible]	440	0.680	350	R	0.31
F-01	XCB	10/17/90	1410	108719	EDI	16.0	5.2	5.6	[illegible]	2	0.680	10	U	0.67
F-01	N	10/16/90	1615	108727	EDI	3.0	5.7	6.6	[illegible]	205	0.030	162	R	0.38
F-02	N	10/17/90	1000	108729	GRAB	3.0	2.9	3.1	[illegible]	1770	0.004	1790	R	0.43
F-03	BFS	10/18/90	1540	108720	EDI			9.2		2100		1610		6.12
F-04	D	10/18/90	1340	108736	EDI	4.0	[illegible]	6.3	432	420	0.390	365		0.34
F-04	N	10/16/90	1330	108735	EDI	4.0	6.1	6.1	430	410	0.390	353		0.34
F-04	XCB	10/18/90	1450	108716	EDI	16.0	[illegible]	6.7	2	2	0.390	10	U	0.67
F-04	N	10/16/90	1045	108722	EDI	3.0	6.4	6.6	[illegible]	360	0.400	292		0.34
F-05	N	10/16/90	1200	108726	EDI	3.0	7.1	7.9	281	280	0.310	222		0.10
F-07	N	10/15/90	1710	108733	GRAB	4.0	7.1	7.3	208	310	0.090	235		0.12
F-08	N	10/30/90		108725				8.2		300				
F-14	LD	10/15/90	1600	108725	GRAB	5.0	7.7	8.0	288	300	0.320	208		0.09
F-14	N	10/17/90	1440	108717	EDI	4.0	6.9	6.9	363	370	1.340	300	R	0.36
F-21	N	10/17/90	1330	108718	EDI	4.0	[illegible]	8.0	195	190	4.210	113	R	0.08
F-22	N	10/17/90	1535	108715	EDI	3.5	[illegible]	7.8	256	245	7.920	160	R	0.07
F-40	N	10/15/90	1830	108734	GRAB	4.0	7.1	7.3	551	480	0.002	407		0.42
F-45	N	10/16/90	1710	108728	EDI	3.0	7.4	5.7	493	450	0.510	396	R	0.32
F-46	N	10/17/90	1125	108723	EDI	0.0	5.5	5.2	465	470	0.737	432		0.39
F-47	N	10/15/90	1500	108732	GRAB	4.0	5.6	7.2	[illegible]	330	0.130	246	R	0.12
F-49														

TES: 1) Sample types are defined as: BFS - blind field standard, D - field duplicate, LD - lab duplicate, N - natural, XCB - cross-contamination blank.

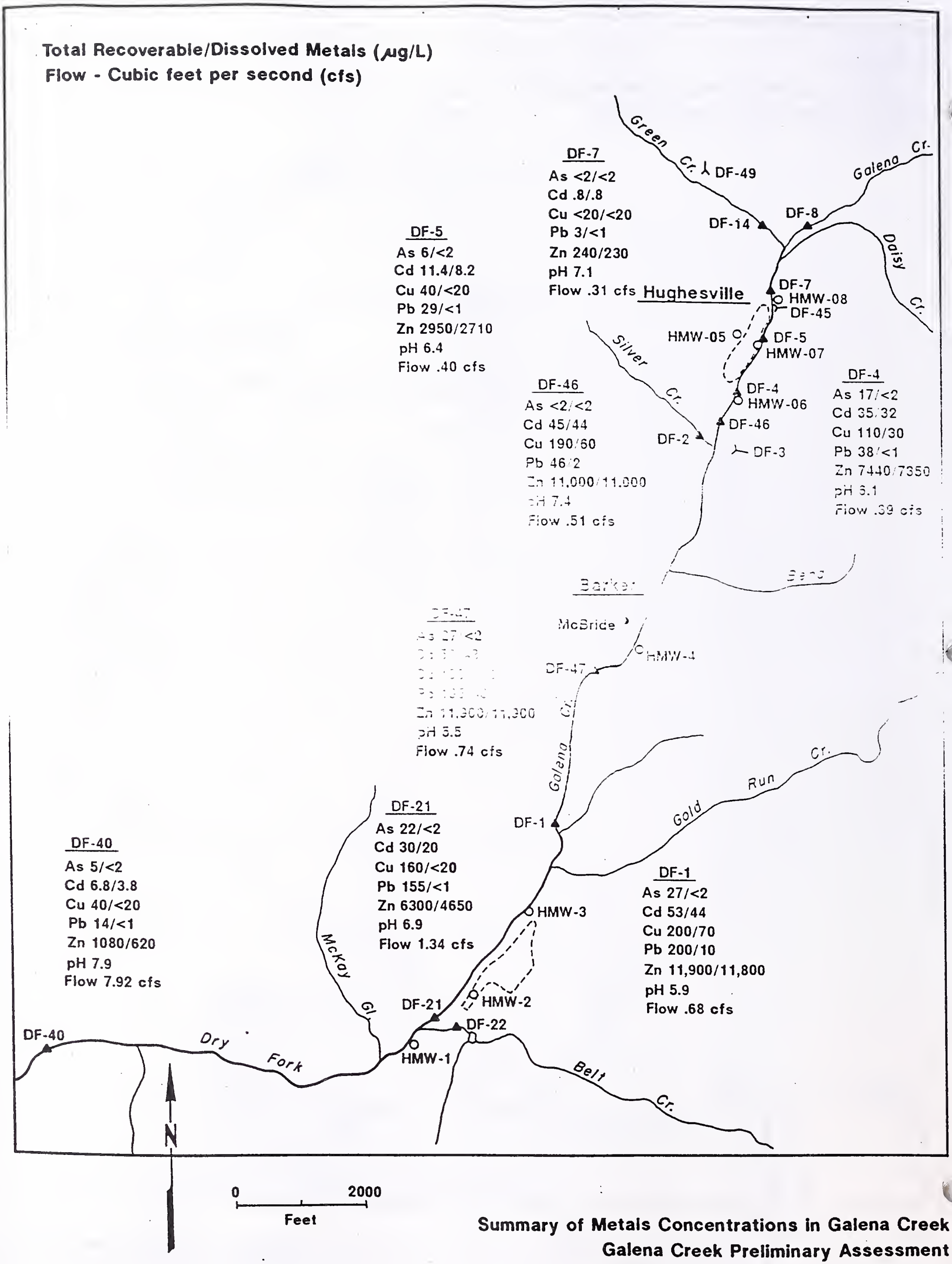
2) Data-quality analysis codes are defined as: A - blind field standard outside of advisory range, C - cross-contamination blank equal to or above detection limit, N - laboratory spike recovery outside control limits, R - field duplicates outside expected range, U - less than detection limit, Z - value not usable for statistics.

3) Blanks indicate values not determined.

4) Sampling methods are defined as: EDI - equal-discharge interval, GRAB - grab sample.



Summary of Metals Concentrations
in Point Sources to Galena Creek
Galena Creek Preliminary Assessment
FIGURE 3-18



Summary of Metals Concentrations in Galena Creek
Galena Creek Preliminary Assessment
FIGURE 3-11

07-090, #2: SW-2 sample location in Galena Creek

07-090, #3: SW-4 at Lucky Strike tailings

07-090, #4: SW-6 sample location in unnamed creek down from Edwards

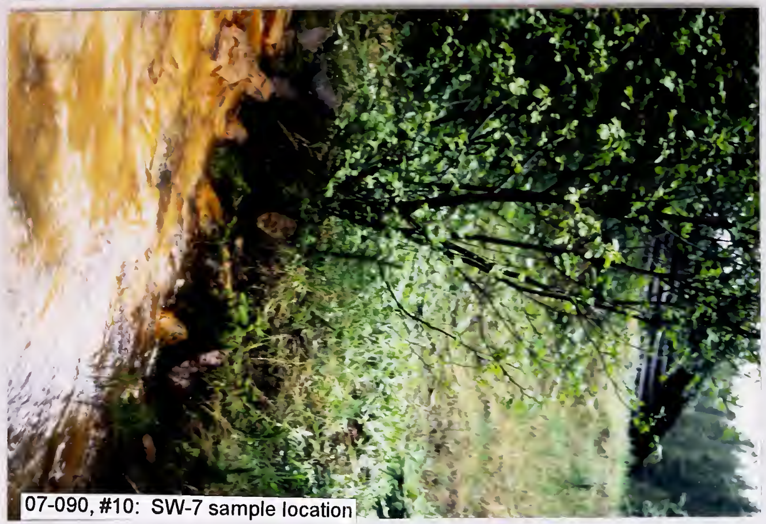
07-090, #5: SW-8 sample location below Block P Tailings

07-090, #6: SW-10 sample location above Block P Mine

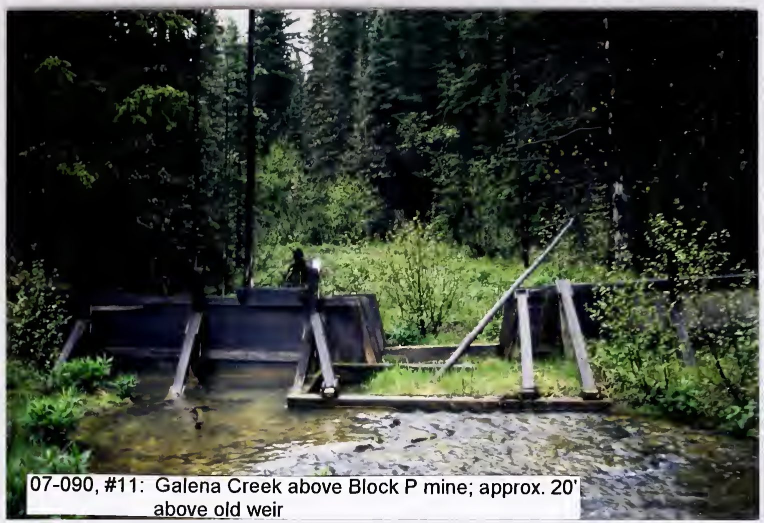
07-090, #7: SW-1 sample location

07-090, #8: SW-3 sample location; upgradient of Block P tails

07-090, #9: SW-5 sample location below Marcelline mine



07-090, #10: SW-7 sample location



07-090, #11: Galena Creek above Block P mine; approx. 20' above old weir

07-090, #12: Daisy Creek (Galena) above confluence west of Green Creek approx. 100'

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: BON TON **PA#:** 07-094

Date: June 3, 1993 **Time:** 1000-1430

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Flammang, Pioneer
Clark, Pioneer

Visitors: Rick Burger, MDSL
Earl McCurley, MDSL

Weather/Seasonality Observations: Sunny; cool (50°F); no breeze.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #25: SW-1, facing south; #26: WR-3; #27: Adit #1, GW-1 sample location; #28: WR-1, facing west; #29: WR-2; #30: SW-2; #31: Aerial view of the site. Video Tape No. 1

General Comments/Observations (not covered specifically in attached Inventory Forms): N/A

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Isolate mine wastes from drainage; grade, amend, and revegetate. Study water treatment alternatives.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): BON TON PA#: 07-094

Legal Description: T 15N ;R 8E ;Sec. 1 , SE1/4 SE1/4 ___1/4

County: CASCADE Mining District: HUGHESVILLE

Latitude: N 47° 04' 58" Longitude: W 110° 38' 52"

Primary Drainage Basin and Code: Dry Fork Belt Creek/10030105
Secondary Drainage Basin: McKay Gulch

USGS Quadrangle map name(s): Barker

Mine Type/Commodities: Hardrock/Silver, Lead, Zinc

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Private/Public
Owner, Agent, or Contact(Include address and phone when available): Henry S. Karki, 1112 7th Avenue South, Great Falls, MT 59405. (406) 454-0010; Lewis and Clark National Forest.

Relationship to other mines/sites in the area/district: Many other mines associated with the Hughesville district are in the vicinity.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 6520' , Slope 30° , Aspect South

Land use: Mining X , Recreational X , Residential___, Urban___, Agricultural___, Other(Specify)

Area of disturbed/unvegetated lands? 0.5 acres.
Dimensions: 160 feet x 90 feet

Predominant vegetation types: Lodgepole pine, Douglas fir, juniper, huckleberry, grouse whortleberry, understory

Access: roads - good___,poor___,4wd X ,trail X .
Other logistical considerations (proximity to other sites).

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are no well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Mine is located near the headwaters of McKay Gulch, a small tributary to the Dry Fork of Belt Creek.

Mining/milling history, ore type/tenor, host rock, gangue: Possible mill structure, but no tailings could be identified during the investigation. Vein was a replacement along a limestone-granite porphyry contact. Minerals present include galena, sphalerite, pyrite and some chalcopyrite.

Mine Operation?

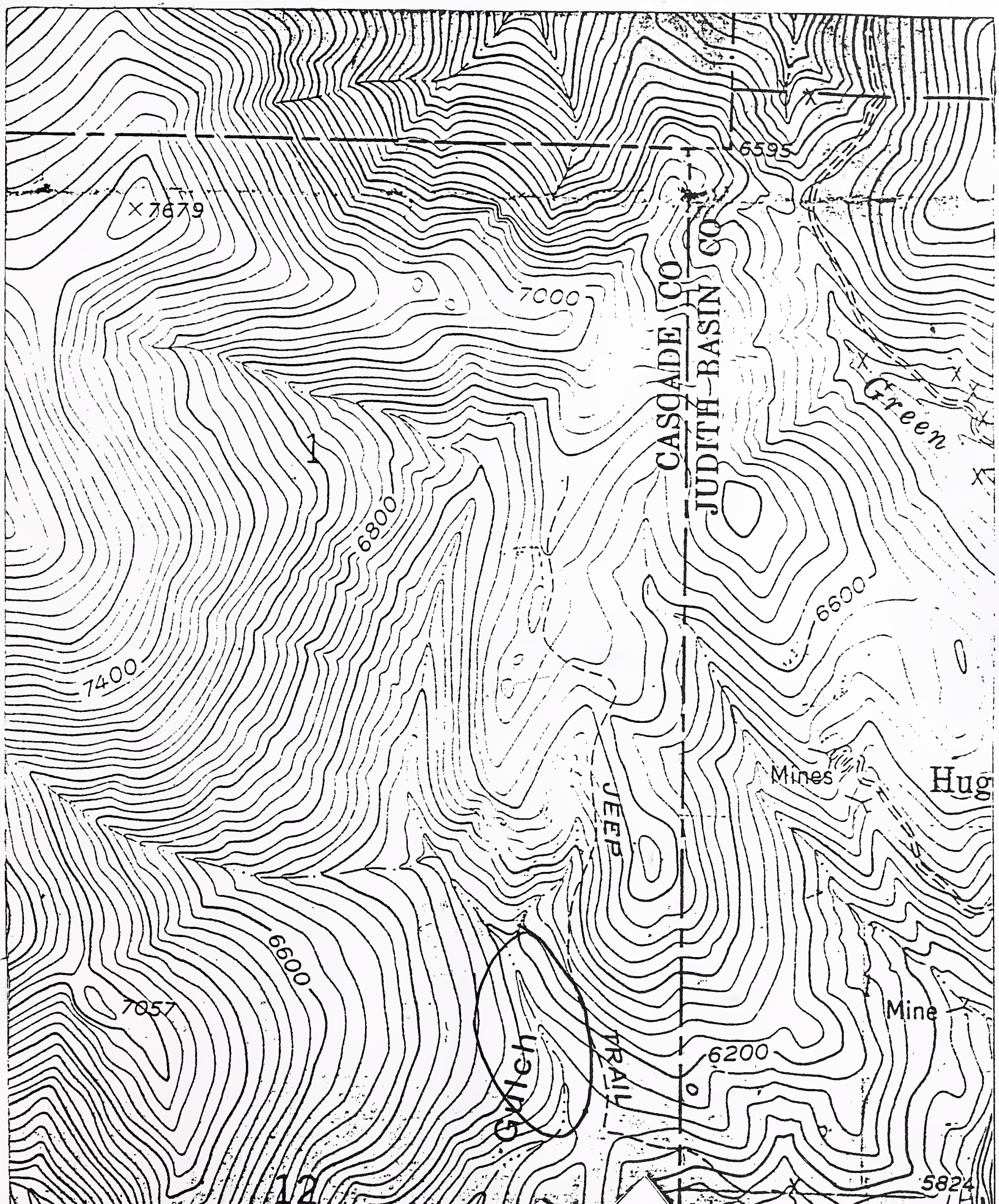
Shafts -	Yes___,	No X ,	# ____,	Comment
Adits -	Yes X ,	No___,	# 2 ,	Comment Fully caved
Pits -	Yes___,	No X ,	# ____,	Comment
Placers -	Yes___,	No X ,	# ____,	Comment
Other -	Yes___,	No X ,	# ____,	Comment

Mill Operation? Yes X , No____. If yes answer the next three questions:

Period(s) of Operation: No historical information could be found on this claim.

Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: Unknown

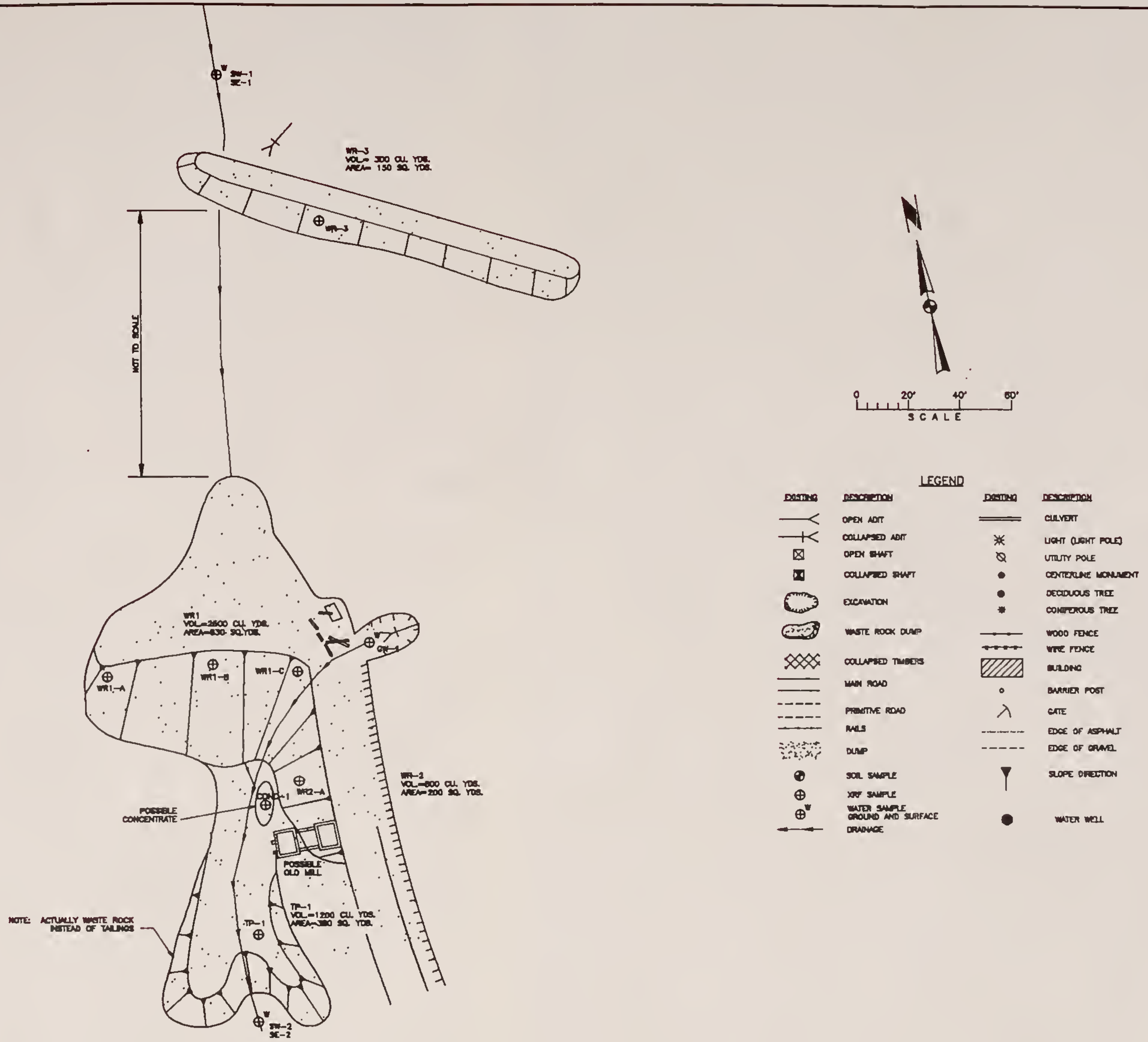
Process? Hg-amalgam, CN$^-$ leach (vat, heap), floatation, smelting? Unknown



PIONEER
TECHNICAL SERVICES, INC.

BON TON, P.A. NO. 07-094

T15N, R08E, SECTION 01
SCALE: 1" = 1000'



DRAWN JTP DATE 23 JUNE 93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

PIONEER TECHNICAL SERVICES INC. BUTTE, MT.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS-BOZEMAN-KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

BON TON MINE PA# 07-094
NEIHART DISTRICT CASCADE COUNTY

SHEET NO.

07-094.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Flammang, Clark, Bullock

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	2,500	Waste rock dump associated with Adit #1; east side	None	< 3.5 (D)	0.05	07-094-WR-1	06/03/93 1410	T-Metals, ABA
WR-1B	WR		Waste rock dump associated with Adit #1; center	None	4.4 (D)	0.06			
WR-1C	WR		Waste rock dump associated with Adit #1; east side	None	4.4 (D)	0.05			
WR-2A	WR	500	Waste rock dump north of mill building, on side of hill with adit; south end	None	5.0 (D)	0.05	07-094-WR-2	06/03/93 1420	T-Metals, ABA
WR-2B	WR		Waste rock dump north of mill building, on side of hill with adit; north end	None	4.5 (D)	0.04			
WR-3	WR	300	Waste rock dump associated with Adit #2, 478′ north of WR-1	None	4.6 (D)	0.05	N/A	N/A	XRF Analysis
TP-1	TAIL	1,200	Possible tailings south of mill building	None	N/A	N/A	N/A	N/A	XRF Analysis
Conc-1	OTH	10	Small concentrate pile northwest of mill building	None	6.88 (S)	0.04	07-094-CONC-1	06/03/93 1400	T-Metals, ABA
SS-1	BKGRND	N/A	Background soil	N/A	N/A	N/A	07-094-SS-1	06/03/93 1404	T-Metals

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: Conc-1 was material identified as possible concentrate by XRF analysis. WR-3 hole had similar XRF data to WR-1A hole so sample was weighted 50% from WR-1A, 25% from WR-1B, and 25% from WR-1C. 07-094-WR-2 is composite of WR-2A and -2B.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes X , No ___, Number: 1 Identification: Adit #1

Filled shafts: Yes___, No X , Number:____ Identification:____________

Seeps/Springs: Yes___, No X , Number:____ Identification:____________

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 0

Distance to nearest well used for drinking? Approximately 0.75 mile

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable X , Possible____, Unlikely____.
Potential for release of contaminants to groundwater. The specific conductance in the adit discharge is also very high.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: Bullock

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
GW-1	AD	Collapsed adit	12 gpm (E)	6.10	980	144	4.4	222	N/A	07-094-GW-1	06/03/93 1145	T-Metals, TDS, Hardness, SO4, Cl-, NO2/NO3

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X, No ___, Name(s): McKay Gulch intermittent stream occasionally flowing underground through dumps

Dry streambeds: Yes ___, No X, Name(s): ___

Other surface water: Yes ___, No X, Name(s)/Description: ___

Waste materials within any floodplain: Yes X, No ___ Source ID(s): WR-1, WR-3

Approximate Flood frequency? X 1 yr, ___ 10 yr, ___ 100 yr

Estimated seasonal flow of stream(s) (cfs)?
High Flow: 1.0 cfs, Average Flow: < 0.1 cfs

Distance between waste source(s) and nearest surface water body (ft)? 0 feet

Surface water draining onto or through waste sources: Yes X, No ___, Describe: WR-1 and WR-3

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?) Irrigation, stock watering, fishery, wetlands

Observed erosional/sedimentation/stream turbidity problems? Yes X, No ___, Distance downstream (ft)? 750+ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): Mine waste in sediment; Iron-staining as far as 750+' downstream.

SURFACE WATER INVENTORY FORM

SAMPLERS: Bullock, Flammang

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-2	SW	Approx. 10 feet downgradient of possible tailings	7.53	630	190	15	180	4.5 gpm (M)	07-094-SW-1	06/03/93 1210	T-Metals, TDS, Hardness, SO4, Cl-, NO2/NO3
SE-2	SE	Approx. 10 feet downgradient of possible tailings	N/A	N/A	N/A	N/A	N/A	N/A	07-094-SE-1	06/03/93 1210	T-Metals
SW-1	SW	Approx. 25 feet upstream from WR-3	7.23	370	290	7.8	170	4 gpm (E)	07-094-SW-2	06/03/93 1230	T-Metals, TDS, Hardness, SO4, Cl-, NO2/NO3
SE-1	SE	Approx. 25 feet upstream from WR-3	N/A	N/A	N/A	N/A	N/A	N/A	07-094-SE-2	06/03/93 1230	T-Metals
SE-500	SE	500 feet from SW-1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	XRF Analysis
SE-750	SE	750 feet from SW-1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	XRF Analysis
SE-100	SE	100 feet upstream from main workings	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	XRF Analysis

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? None

Wetlands present: Yes___, No X, Describe:

Carbonate rocks/soils: Yes X, No___, Describe: Limestone

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30 X; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? Approx. 0.75 mile

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock, Flammang

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	SO3; pH; FEOX	Partial	5,670	5,100	Yes	Observed
WR-2	SO3; pH; FEOX	Partial	1,800	1,620	Yes	Moderate
WR-3	SO3; pH; FEOX	Partial	1,350	1,350	Yes	Low
TP-1	None	Wet	3,420	3,420	Yes	Low
Conc-1	None	Wet	Approx. 180	Approx. 180	No	Low
Adit #1	SPG; FEOX	N/A	N/A	N/A	N/A	N/A

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_,
Describe:____________________

Population within 1 mile: 1-10___; 10-30_X_; 30-100___; 100-300___;
300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments____________________

Evidence of recreational use on site: Yes___, No_X_, Describe:________

Accessibility - Fences, warning signs, closed roads?_Unrestricted___

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment____________
Wilderness Area - Yes___, No_X_, Comment____________
T&E Species Habitat - Yes___, No_X_, Comment____________
Bat Habitat - Yes___, No_X_, Comment____________

Primary Drainage_X_; Secondary Drainage___; No Information___:

Riparian Habitat Quality - High___, Medium_X_, Low___
Wetlands Frontage - High___, Medium___, Low_X_
Fisheries Habitat and Species Classification - _4_
Sport Fishery Classification - _3_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes___, No_X_, Number____, types and locations:___

Hazardous structures: Yes_X_, No___, Number_1_, types and locations:_
Possible mill building

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____,
types and locations:____________________

Unstable waste piles, impoundments, undercut banks: Yes_X_, No____,
Number_2_, types and locations:_WR-1 and WR-3 are eroded by stream._

Fire and/or Explosion hazards: Yes___, No_X_, Explain:____________

Bibliography

MBMG, Geology and Ore Deposits of the Neihart Mining District, Cascade County, Montana, Memoir 13, Written by Paul A. Schafer, July 1935.

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Bon Ton, Prepared by Chen-Northern, August 29, 1987.

USGS, Topographic Map, Barker, Montana, 7 1/2 minute Quadrangle, 1961.

LABORATORY ANALYTICAL DATA

BON TON
PA NO. 07-094

Bon Ton PA# 07-094
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BULLOCK
INVESTIGATION DATE: 06/03/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
07-094-CONC	587 J	127 J	90.2	28.3	13.1 J	25.6 J	41100	0.132	156000	701	2610	98.5 J	93000	NR
07-094-SE-1	51.9 J	75.7 J	2.6	6.87	16.9 J	16.1 J	15600	0.035	959	25.1	335	5.17 UJ	945	NR
07-094-SE-2	219 J	179 J	60.3	4.23	10.3 J	40.5 J	33400	0.105	30700	166	287	25.2 J	21500	NR
07-094-WR-1	523 J	67.3 J	13.5	1.28 U	3.29 J	42.1 J	61700	0.556	11300	51.5	9140	9.24 J	3860	NR
07-094-WR-2	1330 J	36.8 J	187.0	3.27	8.98 J	39.3 J	109000	0.159	41100	175	12300	61.8 J	50900	NR
BACKGROUND	122 J	441 J	5	9.66	26.5 J	22.7 J	33300	0.071	11900	75	375	4.24 J	1570	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
07-094-WR-1	9.4	294	143	-151	0.29	5.32	3.79	166	-23.1
07-094-WR-2	23.9	747	182	-565	10.4	9.58	3.99	299	-117

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
07-094-GW-1	33.9	11.5	20.1	5.99 U	5 U	4.4 J	7060	0.038 U	7920	54.9	10.2	26.6	13000 J	609
07-094-SW-1	1.41	26.8	2.55 U	5.99 U	5 U	5.27 J	35.9	0.038 U	9.9	12.1	4.12	18.3 U	24.7 J	202
07-094-SW-2	14.1	16	8.27	6.17	5 U	11.2 J	2870	0.038 U	2090	18.9	16.6	18.3 U	3340 J	359

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
07-094-GW-1	764	< 5.0	353	< 0.05	NR
07-094-SW-1	221	< 5.0	7	< 0.05	NR
07-094-SW-2	427	< 5.0	161	< 0.05	NR

LEGEND

CONC - Small concentrate pile Northeast of mill building.
SE1 - Approx. 25' upstream from waste rock dump 3.
SE2 - Downgradient of alleged tailings, approx. 10'.
WR1 - Composite of subsamples WR1A and 1B.
WR2 - Composite of subsamples WR2A and 2B.
BACKGROUND - From the Bon Ton Mine (07-094-SS-1).

GW1 - Discharge from a collapsed adit.
SW1 - Same as sample SE1.
SW2 - Same as sample SE2.

XRF ANALYSIS RESULTS

BON TON
PA NO. 07-094

Mine Name: Bon Ton PA# 07-094
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
07-094-01		2227.96	11589.4	164.581 *		244680	27427.5			76119.5	220.03 *	140.853
07-094-DNS-500		3234.7	48297.3	459.255	175.121 *	25936.4	39313.7			20506	263.628 *	222.843
07-094-DNS-750		2665.62	27544.7	241.073 *		52296.7	50879.3			28322	401.195	198.89
07-094-TP1-1A		12542.4	121031	2027.56	130.032 *	5936.67	23965.7			2514.17	136.588 *	401.704
07-094-UPS-100		6288.42	60190.2	702.873		18743.5	27029.4			14197.7	138.353 *	298.403
07-094-WR1-A		20095.3	43144.2	1872.67		542.106 *	55773	492.267 *		1020.38		201.433
07-094-WR1-C		3995.84	88116	675.174	158.368 *	25489.3	40517.4			3592.05	141.148 *	148.347
07-094-WR2-A		2604.83	38858	493.154		38403.8	68192.1			27159.4		45.331 *
07-094-WR2-B		3242.66	67094.8	790.16		49563.8	42208.7			21980.4	435.86 *	105.803
07-094-WR3-A		23405.3	16360.1	1679.03			59269.7	594.577 *		920.542		128.633
07-094-WR-1-COMP		11887.3	48563.5	760.374		12868.6	52227			2896.03		147.147
07-094-WR-2-COMP		2367.44	42662.7	322.373	125.182 *	33919.9	66782.8			20668.2	426.658 *	64.9862

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
07-094-01	28.078 *			1685.79				145.555	111.726 *		
07-094-DNS-500	48.6058			239.949	38.2589 *			198.92	78.9221 *		
07-094-DNS-750	35.0034			206.463	38.2962 *			293.642	168.325 *		
07-094-TP1-1A	82.9342			599.298	65.8413 *			382.997	127.357 *		10.0576 *
07-094-UPS-100	54.5686			701.117	78.8497	112.041 *		379.089	85.3059 *		
07-094-WR1-A	121.935			7145.2	246.321			895.702	174.077 *		25.9541 *
07-094-WR1-C	17.9657 *			747.131				36.8894 *	97.7537 *		
07-094-WR2-A	28.6592 *			6733.07		167.418 *		91.4777	92.8225 *		
07-094-WR2-B	46.7244			2454.76	33.245 *			228.513	90.643 *		
07-094-WR3-A	147.116		11.9829 *	7813.12	215.551			550.799	202.918 *		38.5482 *
07-094-WR-1-COMP	82.3018			6347.31	144.49			429.492	133.619 *		27.028 *
07-094-WR-2-COMP	12.4529 *			3048.4	28.3852 *			121.702	81.686 *		

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

BON TON
PA NO. 07-094

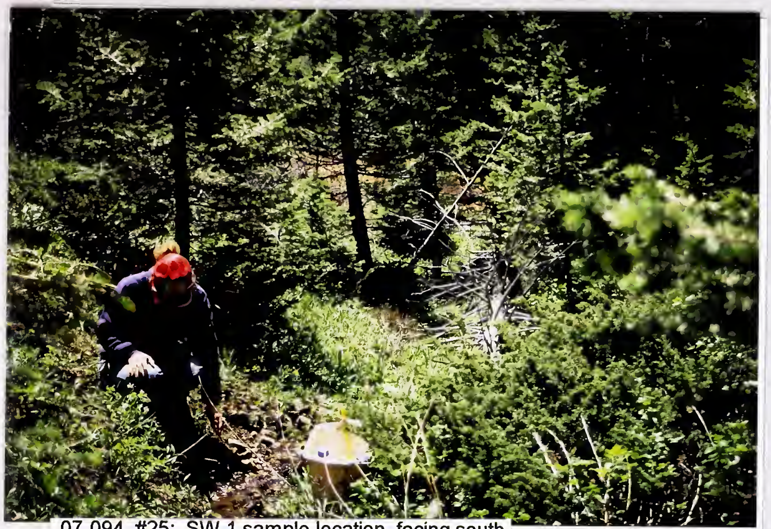
AIMSS SCORESHEET

SITE NAME: BON TON
PA NUMBER: 07-094

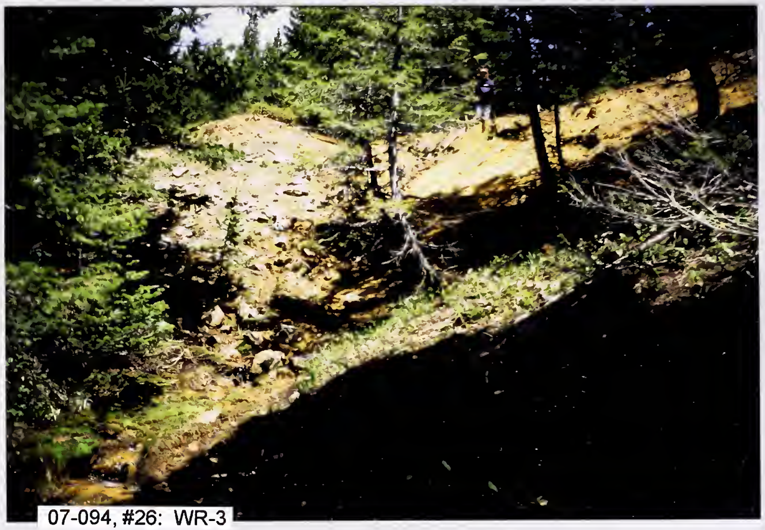
LINE NO.				
		GROUNDWATER PATHWAY		
1		OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A	GW - LIKELIHOOD OF RELEASE	CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	14.875
6		WELLS - 1 MI. x 2.5		0.0
7	GW - TARGETS	WELLS - 1 TO 4 MI		0
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	0.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	0
		SURFACE WATER PATHWAY		
11		OBSERVED RELEASE		300
12	SW - LIKELIHOOD OF RELEASE	EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	700
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	16.489
16		DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		1
18		WETLANDS		10
19	SW - TARGETS	FISHERY		1
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 - 22	19
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	219304
		AIR PATHWAY		
25		OBSERVED RELEASE		0
26A	AIR - LIKELIHOOD OF RELEASE	CONTAINMENT		10
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	50
27		LIKELIHOOD SCORE	LINES 25 + 26C	50
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.253
29		POPULATION - 4 MILES		1
30		NEAREST RESIDENCE		0
31	AIR - TARGETS	WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 - 33	1
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	13
		DIRECT CONTACT PATHWAY		
36		OBSERVED EXPOSURE		0
37A	LIKELIHOOD OF EXPOSURE	ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	100
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.231
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		1
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 - 42	1
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	23
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**2.19**

SITE NAME: BON TON
PA NUMBER: 07-094

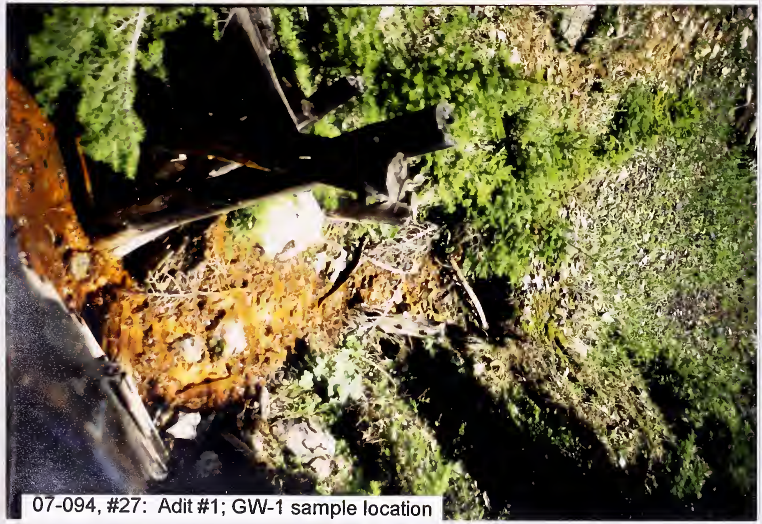
LINE NO.		SITE SAFETY		
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	40
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 - 7	40
9		POPULATION - 1 MILE		1
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 - 11	1
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**0.80**



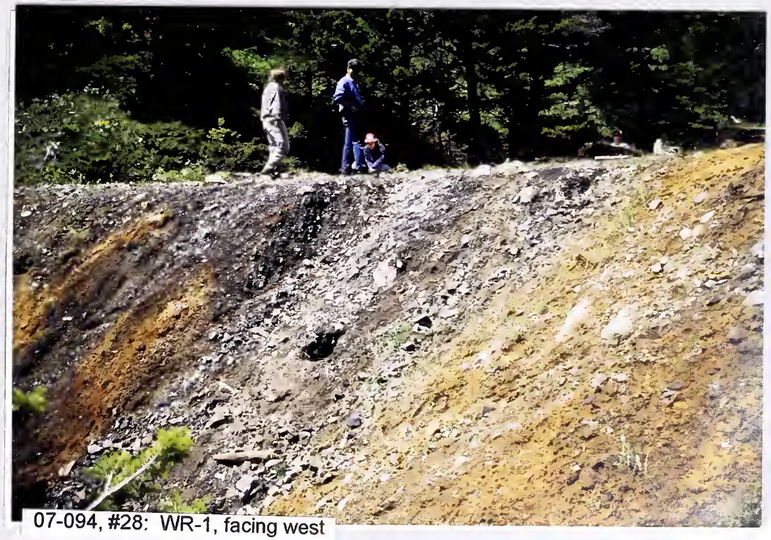
07-094, #25: SW-1 sample location, facing south



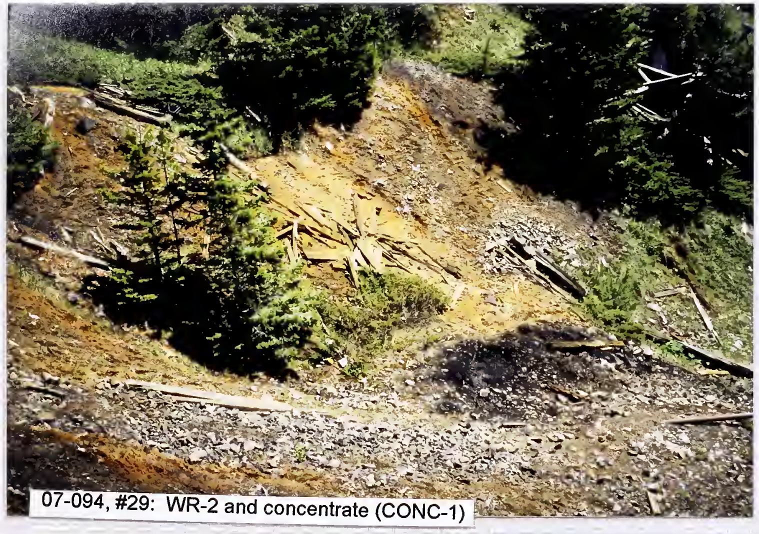
07-094, #26: WR-3



07-094, #27: Adit #1; GW-1 sample location

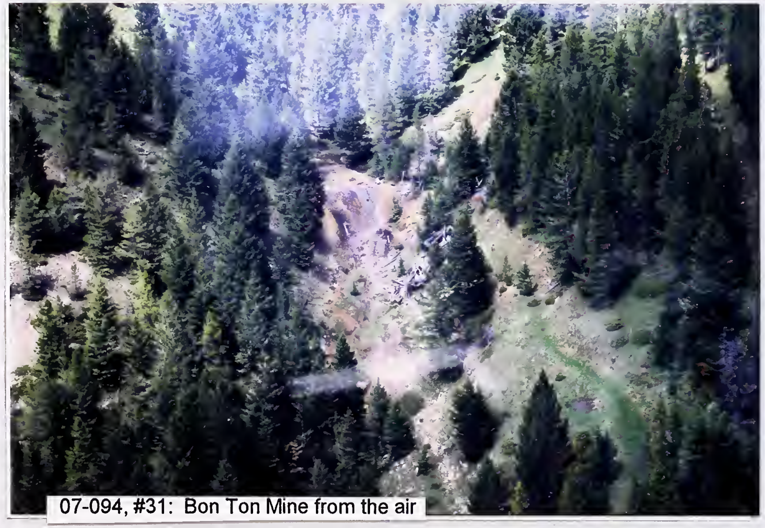


07-094, #28: WR-1, facing west



07-094, #29: WR-2 and concentrate (CONC-1)

07-094, #30: SW-2 sample location up from WR-3



07-094, #31: Bon Ton Mine from the air

NEIHART

20
0

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: VILIPA PA#: 07-080

Date: July 29, 1993 Time:

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Pierson, TD&H
Clark, Pioneer

Visitors: None

Weather/Seasonality Observations: Partly cloudy; light showers; 50°F to 60°F; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #9: SW-2 sample location; #10: WR-11; #11: WR-10; #12: WR-9; #13: WR-8; #14: WR-6 and WR-7; #15: WR-4; #16: Flooded shaft; #17: WR-3 and sample location of SW-2; #18: Caved shaft at WR-3; #19: WR-2; #20: WR-1; #21: SW-1 sample location. Video Tape No. 4

General Comments/Observations (not covered specifically in attached Inventory Forms): The Vilipa Mine as originally inventoried only included WR-1, WR-2, and WR-3. WR-4 through WR-12 were added to the site investigation because they represent potential sources to McKay Creek in very close proximity to the dumps originally inventoried.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Isolate McKay Creek from waste materials. Grade, amend, and revegetate waste rock dumps. Backfill hazardous shafts.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): VILIPA PA#: 07-080

Legal Description: T 14N ;R 8E ;Sec. 16 , SW1/4 NE1/4 ___1/4

County: CASCADE Mining District: NEIHART

Latitude: N 46° 58' 31" Longitude: W 110° 42' 40"

Primary Drainage Basin and Code: Belt Creek/10030105
Secondary Drainage Basin: McKay Creek

USGS Quadrangle map name(s): Neihart

Mine Type/Commodities: Hardrock/Silver, Gold, Lead, Zinc, Copper

Activity Status: Active___, Inactive/Exploration___, Abandoned X .

Ownership status: Known YX N__; private/public? Private/Public
Owner, Agent, or Contact(Include address and phone when available): Peter Antonioli, Alexandra Resources Co., P.O. Box 791, Butte, MT 59703. (406) 723-8730; Lewis and Clark National Forest.

Relationship to other mines/sites in the area/district: The Vilipa Mine is part of Hegener Group composed of Gold Rock, Copper Queen and Baker Mines. Gold Rock and Copper Queen may have been sampled during this investigation.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 6200'-6300' , Slope 3°-30° , Aspect Southwest

Land use: Mining___, Recreational X , Residential___, Urban___, Agricultural___, Other(Specify)___

Area of disturbed/unvegetated lands? 6 acres.
Dimensions: Approx. 2,070 feet x 130 feet along the north side of McKay Creek

Predominant vegetation types: Lodgepole pine forest

Access: roads - good___, poor___, 4wd X , trail___.
Other logistical considerations (proximity to other sites). Baker Mine is above Vilipa on the south side of the drainage.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 2 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Vilipa lies along the north side of perennial McKay Creek. The creek flows southeast past the site to confluence with Carpenter Creek approx. 1/3 of a mile away. Creek is also identified as Hegener Creek in literature. Site is underlain by various gneiss, pinto diorite and the Snow Creek quartz porphyry all crossed by a complex network of quartz porphyry and granite porphyry.

Mining/milling history, ore type/tenor, host rock, gangue: A few small shipments made from Hegener Group including the Vilipa in 1922. Vilipa vein strikes northwest. Shaft was sunk in 1902. Vein mineralization, quartz gangue containing silver, gold, zinc, lead, and a trace of copper in massive galena, sphalerite, pyrite, chalcopyrite, and brittle silver sulfides.

Mine Operation?

Shafts - Yes X, No ___, # 3, Comment All open, but partially collapsed

Adits - Yes X, No ___, # 13, Comment 12 collapsed; 1 open

Pits - Yes ___, No X, # ___, Comment ___

Placers - Yes ___, No X, # ___, Comment ___

Other - Yes ___, No X, # ___, Comment ___

Mill Operation? Yes ___, No X. If yes answer the next three questions:

Period(s) of Operation: N/A

Origin of Ore Milled - Custom Mill ___ Dedicated Mill ___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
N/A

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

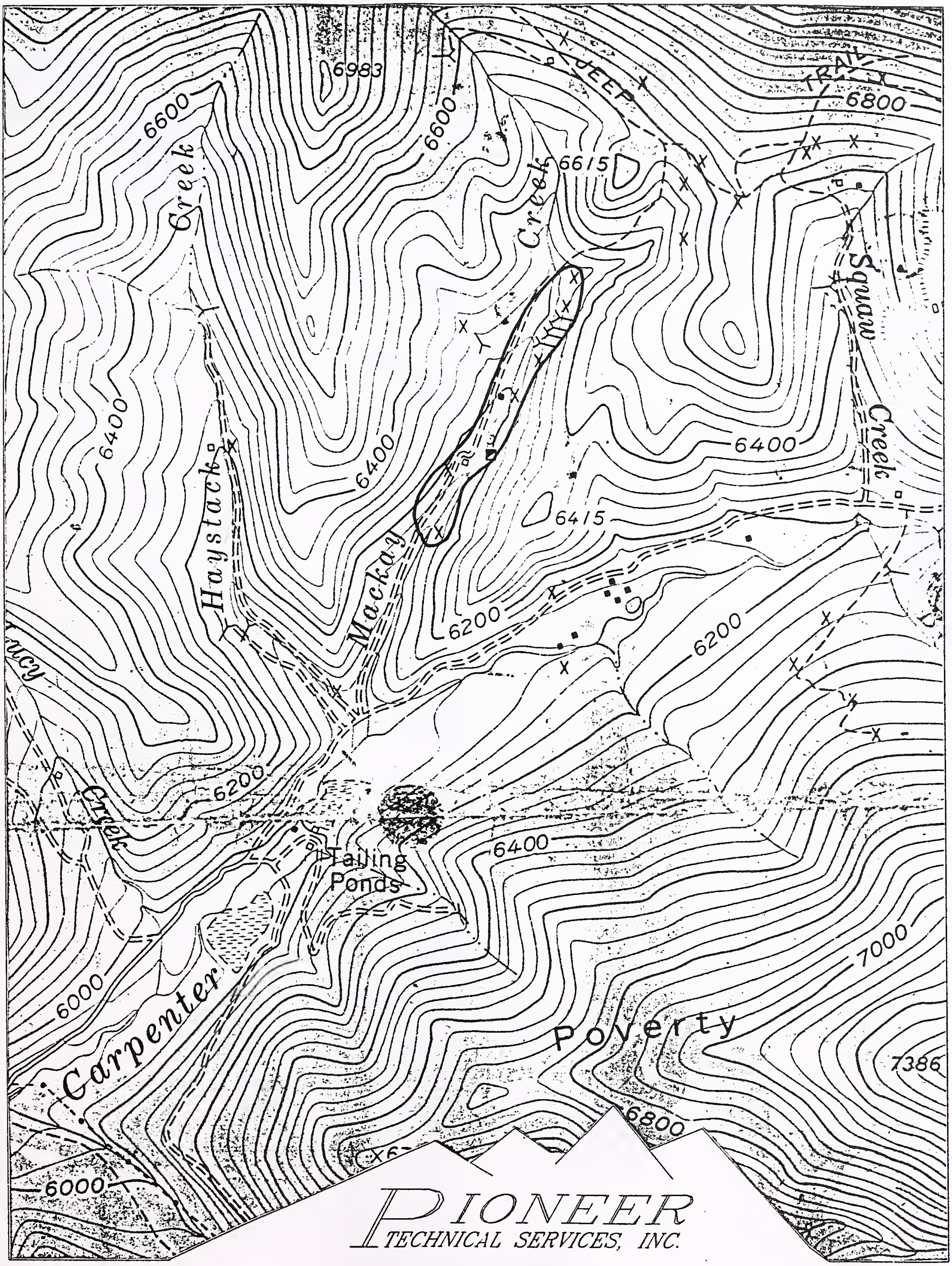
Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

Montana Bureau of Mines and Geology
Water Well Log Data

11/10/1993

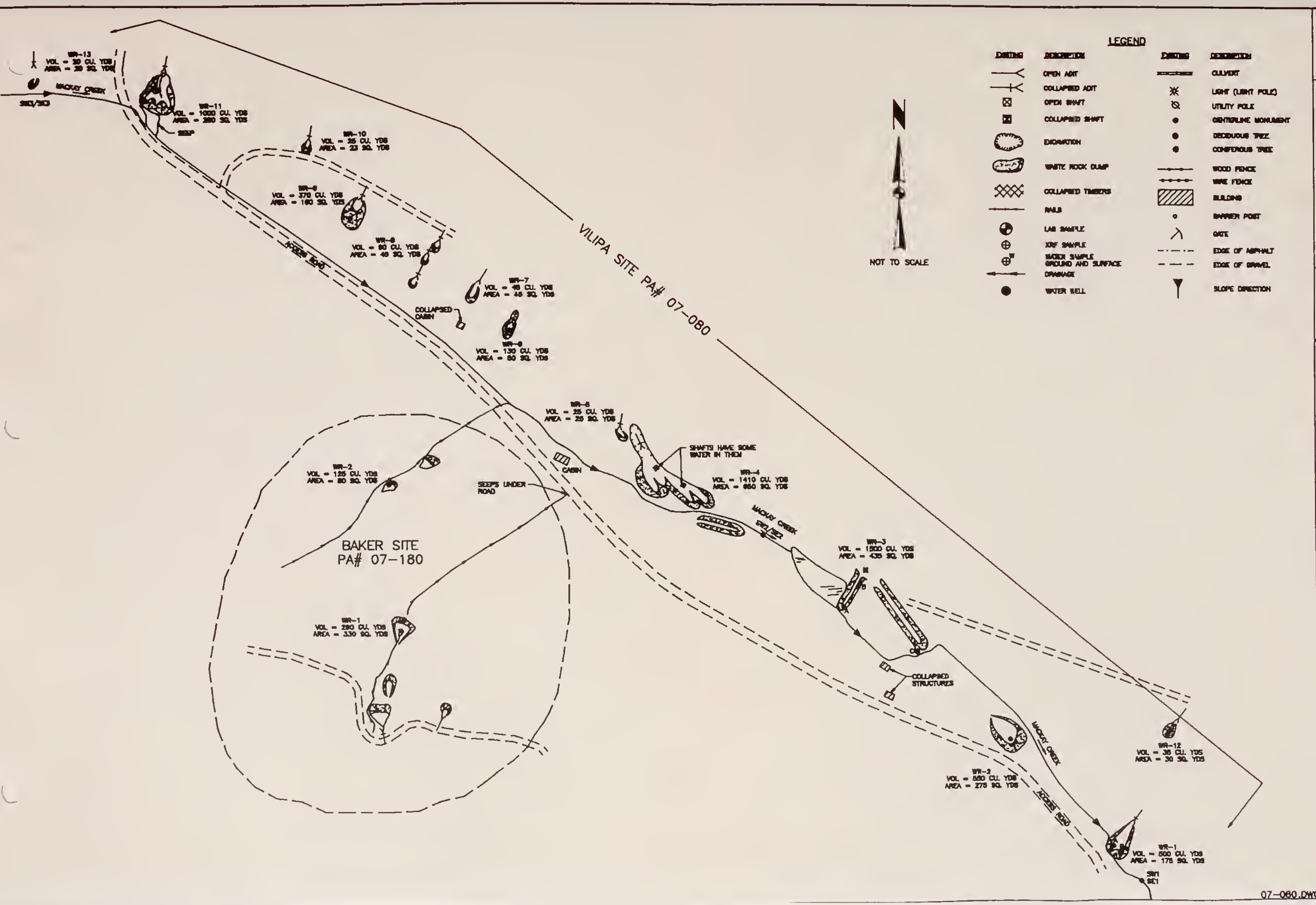
Well No.	Location	Depth	Yield	Static Water Level
M:123062	14N 08E 20 DBA	41.0	4.0	24.00
M:123061	14N 08E 20 DBA	40.0	7.0	0.00



PIONEER TECHNICAL SERVICES, INC.

VILIPA, P.A. NO. 07-080

T14N, R08E, SECTION 16
SCALE: 1' = 1000'



MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

VILIPA & BAKER PA# 07-080 & 180
NEIHART DISTRICT CASCADE COUNTY

PIONEER TECHNICAL SERVICES, INC. BUTTE, MT.

DRAWN MWC DATE 12/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

TDH
THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS-BOZEMAN-KALISPELL MONTANA
SPOKANE WASHINGTON

SHEETS

SHEET NO.

SOURCE INVENTORY FORM

SAMPLERS: Bullock, Pierson

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	500	Eastern most pile; west lobe on top	None	NM	NM	07-080-WR-1	07/29/93 1340	T-Metals, ABA
WR-1B	WR		Eastern most pile; southeastern lobe on top	None	NM	NM	N/A	N/A	XRF Analysis
WR-2A	WR	550	South side of McKay Creek, northeast of WR-1; on top of southeast side	None	NM	NM			
WR-3A	WR	1,500	Assoc. with ponded water; south end of upper lobe on top	None	NM	NM			
WR-3B	WR		Assoc. with ponded water; northeast end of upper lobe	None	NM	NM			
WR-3C	WR		Lobe below WR-3 on south end	None	NM	NM			
WR-4A	WR	1,410	Assoc. with two shafts	None	6.2 (D)	0.085	07-080-WR-2	07/29/93 1400	T-Metals, ABA
WR-5	WR	25	Pile just northwest of WR-4	None	N/A	N/A	N/A	N/A	N/A
WR-6A	WR	130	Pile above WR-5, east of collapsed cabin	None	6.5 (D)	0.07			
WR-7	WR	45	Small dump east of cabin	None	N/A	N/A	N/A	N/A	N/A
WR-8	WR	90	Three small adits and dump north of cabin	None	N/A	N/A	N/A	N/A	N/A
WR-9A	WR	370	West of WR-8	None	6.9 (D)	0.07			
WR-10	WR	25	Northwest of WR-9	None	N/A	N/A	N/A	N/A	N/A
WR-11	WR	1,000	Large upper most dump west of WR-9	None	< 3.5 (D)	0.035			
WR-12	WR	35	South side of creek from WR-4 and WR-10	None	N/A	N/A	N/A	N/A	N/A
WR-13	WR	20	Small dump west of WR-11	None	N/A	N/A	N/A	N/A	N/A

*D-Direct reading (Kelway Meter); S-Saturated Paste (Orion Meter)

Comments or deviations from SOPs: 07-080-WR-1 is composite of WR-1A, WR-2A, and WR-3A through -3C. 07-080-WR-2 is composite of WR-4A, WR-6A, WR-9A and WR-11. NM = Not Measured

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes X, No____, Number: 1 Identification: Adit associated with WR-11

Filled shafts: Yes X, No___, Number: 2 Identification: Shafts on WR-4

Seeps/Springs: Yes X, No___, Number: 1 Identification: Seep at toe of WR-11

Groundwater wells within 4 miles?: Yes X, No___;
Number of well logs: 21

Distance to nearest well used for drinking? 1/2 mile away on Squaw Creek

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable X, Possible____, Unlikely____.
Contaminated mine wastes are probably in contact with shallow alluvial groundwater.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS:

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X , No ___, Name(s): McKay Creek

Dry streambeds: Yes ___, No X , Name(s):

Other surface water: Yes X , No ___, Name(s)/Description: Ponded water on WR-11 and behind upper lobe of WR-3

Waste materials within any floodplain: Yes X , No ___ Source ID(s): WR-1, WR-3, and WR-4

Approximate Flood frequency? X 1 yr, ___10 yr, ___100 yr

Estimated seasonal flow of stream(s) (cfs)?
High Flow: 10 cfs , Average Flow: 1.0 cfs

Distance between waste source(s) and nearest surface water body (ft)? 0 feet; Toe of WR-1 is in McKay Creek, ponded water is backed up behind upper lobe of WR-3, and toe of WR-4 is near McKay Creek.

Surface water draining onto or through waste sources: Yes X , No ___,
Describe: McKay Creek is actively cutting WR-4 and is ponded behind WR-3.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Fishery (Belt Creek), wetlands, stock watering

Observed erosional/sedimentation/stream turbidity problems? Yes X , No ___, Distance downstream (ft)? >1000 Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): Some iron-staining and elevated metals levels in sediments at 1,000 feet below WR-1.

SURFACE WATER INVENTORY FORM

SAMPLERS: Bullock, Pierson

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	McKay Creek downstream of WR-1	7.61	130	220	9.2	16.5	1 cfs (M)	07-080-SW-1	07/29/93 1130	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-1	SE	McKay Creek downstream of WR-1	N/A	N/A	N/A	N/A	N/A	N/A	07-080-SE-1	07/29/93 1130	T-Metals
SW-2	SW	McKay Creek between WR-3 and WR-4	7.36	120	165	9.2	18	NM	07-080-SW-2	07/29/93 1230	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-2	SE	McKay Creek between WR-3 and WR-4	N/A	N/A	N/A	N/A	N/A	N/A	07-080-SE-2	07/29/93 1200	T-Metals
SW-3	SW	McKay Creek upstream of WR-11 approx. 300 feet	7.69	110	167	9.9	25	0.03 cfs (M)	07-080-SW-3	07/29/93 1230	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-3	SE	McKay Creek upstream of WR-11 approx. 300 feet	N/A	N/A	N/A	N/A	N/A	N/A	07-080-SE-3	07/29/93 1230	T-Metals
SE-500	SE	500 feet below WR-1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	XRF Analysis
SE-1000	SE	1,000 feet below WR-1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	XRF Analysis

***FLOW: Estimated (E) or Measured (M)?**

Comments or Deviations from the SOPs (Pioneer SAP, 1993): SW-2 was collected on McKay Creek to distinguish potential impacts between the site as originally inventoried and the upper workings identified during this investigation.

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	*(SO_3)*
Presence of evaporative salt deposits?	*(ESD)*
Discolored or turbid seepage?	*(SPG)*
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	*(FEOX)*
Presence of burned or stressed vegetation?	*(VEG)*
$pH \leq 5.0$	*(pH)*

General Potential for AMD Mitigation:

Area available for treatment (acres)? Approx. 10 to 15 acres adjacent to and below the site; broad floodplain

Wetlands present: Yes X **, No**___**, Describe:** Approx. 2 acres adjacent to and below site

Carbonate rocks/soils: Yes___**, No** X **, Describe:**___

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X **; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments**___

Nearest residence(ft or miles)? 1/2 mile to northeast on Squaw Creek

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock, Pierson

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	FEOX	Partial	1,575	1,496	Yes	Low
WR-2	FEOX	Partial	2,476	2,230	Yes	Low
WR-3	FEOX	Partial	3,915	3,500	Yes	Low
WR-4	FEOX	Partial	5,850	5,560	Yes	Low
WR-5	FEOX	Partial	225	215	Yes	Low
WR-6	FEOX	Partial	450	405	Yes	Low
WR-7	FEOX	Dry	405	385	Yes	Low
WR-8	FEOX	Dry	405	405	Yes	Low
WR-9	FEOX	Dry	1,440	1,440	Yes	Low
WR-10	FEOX	Dry	207	197	Yes	Low
WR-11	pH; FEOX	Partial	2,520	2,400	Yes	Low
WR-12	FEOX	Dry	270	257	Yes	Low
WR-13	FEOX	Dry	180	180	Yes	Low

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_,
Describe:____

Population within 1 mile: 1-10_X_; 10-30___; 30-100___; 100-300___;
300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments____

Evidence of recreational use on site: Yes_X_, No___, Describe:_Recent tire tracks; litter around old cabins

Accessibility - Fences, warning signs, closed roads?_Unrestricted

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment____________________
Wilderness Area - Yes___, No_X_, Comment____________________
T&E Species Habitat - Yes___, No_X_, Comment____________________
Bat Habitat - Yes___, No_X_, Comment____________________

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High_X_, Medium___, Low___
Wetlands Frontage - High___, Medium_X_, Low___
Fisheries Habitat and Species Classification - _3_
Sport Fishery Classification - _3_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_4_, types and locations:___ Three shafts, two of which are associated with WR-4 and one is associated with WR-3; one open adit above WR-7.

Hazardous structures: Yes_X_, No___, Number_1_, types and locations:_ Collapsed cabin

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____,
types and locations:____

Unstable waste piles, impoundments, undercut banks: Yes_X_, No____, Number_2_, types and locations:_Dumps associated with WR-3 and WR-4 are being eroded by McKay Creek.

Fire and/or Explosion hazards: Yes___, No_X_, Explain:____________________

Bibliography

MBMG, Geology and Ore Deposits of the Neihart Mining District, Cascade County, Montana, Memoir 13, Written by Paul A. Schafer, July 1935.

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Vilipa, Prepared by Chen-Northern, October 31, 1989.

MDSL/AMRB Files, Department of the Interior, Office of Surface Mining, Abandoned Mine Lands Inventory Update Form for Vilipa, Prepared by L.C. Hanson Company, December 10, 1985.

USBM, Mines and Mineral Deposits (Except Fuels), Cascade County, Montana, Information Circular No. 7589, Written by Almon F. Robertson, April 1950.

USGS, Topographic Map, Neihart, Montana, 7 1/2 minute Quadrangle, 1961.

LABORATORY ANALYTICAL DATA

VILIPA
PA NO. 07-080

Vilipa PA# 07−080
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER − BULLOCK
INVESTIGATION DATE: 07/29/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
07−080−SE−1	8	135 J	6.9	23.4 J	24.4	283 J	19500	0.089 J	1820	14 J	242 J	8 U	650 J	NR
07−080−SE−2	14	188 J	14.6	72 J	14.5	425 J	24300	0.074 J	3840	26 J	899 J	8 U	1170 J	NR
07−080−SE−3	5 U	61.3 J	3.3	8.2 J	23.9	33.8 J	10700	0.03 J	372	12 J	100 J	6 U	315 J	NR
07−080−WR−1	14	137 J	2.1	5 J	17.6	108 J	18100	0.917 J	294	10 J	775 J	7 U	258 J	NR
07−080−WR−2	20	130 J	1.6	6 J	36.9	151 J	22000	0.397 J	217	6 J	530 J	7 U	126 J	NR
BACKGROUND	10.5	131	1.4	6.83	22.2	26.1	20600	0.048 U	607	15.6	667	3.39 UJ	548	NR

U − Not Detected; J − Estimated Quantity; X − Outlier for Accuracy or Precision; NR − Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
07−080−WR−1	0.88	27.5	20.6	−6.85	0.18	0.39	0.31	12.2	8.45
07−080−WR−2	0.20	6.25	1.78	−4.47	0.13	0.01	0.06	0.31	1.46

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
07−080−SW−1	3.22	21.8	2.57 U	9.7 U	6.83 U	18.9	143 J	0.11	24.9	12.7 U	1.8 J	30.7 U	201	36.6
07−080−SW−2	3.51	21.3	2.57 U	9.7 U	6.83 U	20.1	139 J	0.12	23.3	12.7 U	1.5 J	30.7 U	203	34.6
07−080−SW−3	4.05	17.9	2.57 U	9.7 U	6.83 U	4.83	102 J	0.065	4.08 U	12.7 U	1 J	30.7 U	71.8	33.9

U − Not Detected; J − Estimated Quantity; X − Outlier for Accuracy or Precision; NR − Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2−N	CYANIDE
07−080−SW−1	87	< 5.0	27	< 0.05	NR
07−080−SW−2	102	< 5.0	25	< 0.05	NR
07−080−SW−3	85	< 5.0	18	< 0.05	NR

LEGEND

SE1 -Downstream of site on McKay Creek
SE2 -McKay Creek between WR−3 and WR−4
SE3 -Upstream from site on McKay Creek
WR1 − Composite of subsamples WR1A, 2A, 3A, 3B, and 3C.
BACKGROUND − From the Silver Dyke Adit (07−135−SS−1).

SW1 − Same as SE−1
SW2 − Same as SE−2
SW3 − Same as SE−3

XRF ANALYSIS RESULTS

VILIPA
PA NO. 07-080

Mine Name: Vilipia PA# 07-080
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
07-080-SE-1000		5423.79	5045.73	514.955 *		792.923 *	17868.3		1156.79	866.991		90.8232
07-080-SE-500		10967.8	5181.18	873.594		3127.24	19961.6	226.367 *	249.262	568.779		366.918
07-080-WR11-A		20240.1	12719.5	4611.49		1048.87 *	57048.4		326.453	150.138 *		531.069
07-080-WR1-A		18840.1	16508.5	1034.34	244.147 *	903.55 *	13030.6		118.422 *	455.105	51.7779 *	113.078
07-080-WR1-B		30266.1	2734.99	913.12		260.112 *	15349.5		64.3845 *			110.496
07-080-WR2-A		20969.4	1596.59	1030.43		277.066 *	26095		124.853 *	186.623		203.571
07-080-WR3-A		12455.3	4495.1	1418.01	246.514 *		34225	280.199 *	77.8058 *	218.099		187.247
07-080-WR3-B		20602.3	19686.4	1180.44		2192	30029.2			992.291		310.452
07-080-WR3-C		14820.6	15083.6	1026.67		535.85 *	25762.9		279.604	464.628		122.414
07-080-WR4-A		22144.2	1728.13	809.977		321.836 *	38065.4		338.281	403.582		241.6
07-080-WR6-A		21195.8	1330.85	435.485 *		295.265 *	27396.6		172.404	420.193		312.59
07-080-WR9-A		18827.7	1332.57	582.624	262.246 *		14131.4		113.611 *	120.757 *	84.831 *	207.671
07-080-WR-1-COMP		14993.4	10531.3	1081.08	231.554 *	551.226 *	26474.1		119.976 *	328.097		165.67
07-080-WR-2-COMP		17546.3	5849.24	2002.88		642.395 *	36452.5		164.735 *	215.297		411.763
07-080-WR-5		26570.5	1217.79	610.136	163.94 *	330.391 *	14517.8		70.017 *	53.5377 *	42.4417 *	130.648

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
07-080-SE-1000	50.2371		69.3191	237.727	69.9344			245.319		32.5267 *	19.4574 *
07-080-SE-500	119.471		84.2823	172.557	152.03			1910.8		22.1524 *	28.5265
07-080-WR11-A	65.7465		210.487	272.47	180.985			661.197			6.63358 *
07-080-WR1-A	327.504		31.9687	49.7327 *	212.44			1403.37		15.2204 *	16.4844 *
07-080-WR1-B	371.9		150.568	31.2297 *	221.047			1485.52			18.4525 *
07-080-WR2-A	28.3353		171.276	2123.95	230.616		51.8787 *	4529.72	116.908 *		
07-080-WR3-A	85.1879		304.501	790.008	240.287			1281.04	109.736 *		14.0907 *
07-080-WR3-B	114.739		223.259	350.019	252.089			441.264			20.6863 *
07-080-WR3-C	58.066		88.9265	279.168	278.262			828.247			14.8042 *
07-080-WR4-A	238.185		184.139	3676.08	247.55			1361.52		21.4583 *	66.7375
07-080-WR6-A	169.001		121.964	1442.22	205.907			1281.01	83.3983 *	18.2474 *	57.8139
07-080-WR9-A	130.905		194.976	438.263	189.816		103.16 *	1101.41		17.1881 *	39.4501
07-080-WR-1-COMP	107.093		170.452	724.809	207.45			1667.12			12.6845 *
07-080-WR-2-COMP	120.692		178.495	618.594	207.078			1078.52	91.8648 *		32.055
07-080-WR-5	318.879		483.697	101.271	262.738			1803.67			25.3882

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

VILIPA
PA NO. 07-080

AIMSS SCORESHEET

SITE NAME: VILIPA
PA NUMBER: 07-080

GROUNDWATER PATHWAY

LINE NO.				
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.145
6	GW - TARGETS	WELLS - 1 MI. x 2.5		5.0
7		WELLS - 1 TO 4 MI		19
8		NEAREST WELL		5
9		TARGETS SCORE	LINES 6 + 7 + 8	29.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	1682

SURFACE WATER PATHWAY

LINE NO.				
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		300
12		EXCEEDENCES		50
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	750
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.161
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		1
18		WETLANDS		10
19		FISHERY		5
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 - 22	23
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	2777

AIR PATHWAY

LINE NO.				
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		10
26B		DISTANCE TO POPULATION		10
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	100
27		LIKELIHOOD SCORE	LINES 25 + 26C	100
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.002
29	AIR - TARGETS	POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		5
31		WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 - 33	45
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	9

DIRECT CONTACT PATHWAY

LINE NO.				
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		50
37A		ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		10
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	200
38		LIKELIHOOD SCORE	LINES 36 + 37C	250
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.002
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		1
41		NEAREST RESIDENCE		5
42		RECREATIONAL USE		5
43		TARGETS SCORE	SUM LINES 40 - 42	11
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	6

LINE NO.		
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000	**0.04**

SITE NAME: VILIPA
PA NUMBER: 07-080

SITE SAFETY

LINE NO.				
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	300
3		OPEN ADITS	50 EA.	50
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	40
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 - 7	390
9		POPULATION - 1 MILE		1
10	TARGETS	NEAREST RESIDENCE		5
11		RECREATIONAL USE		5
12		TARGETS SCORE	SUM LINES 9 - 11	11
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**85.80**

07-080, #9: SW-2 sample location

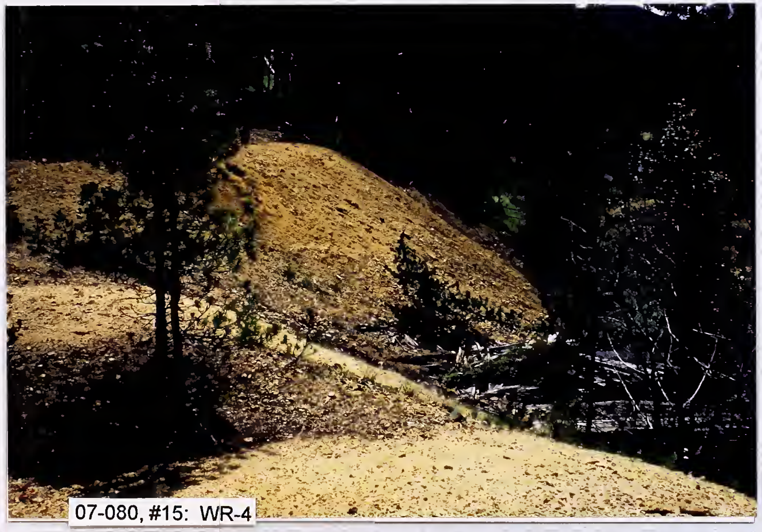
07-080, #10: WR-11

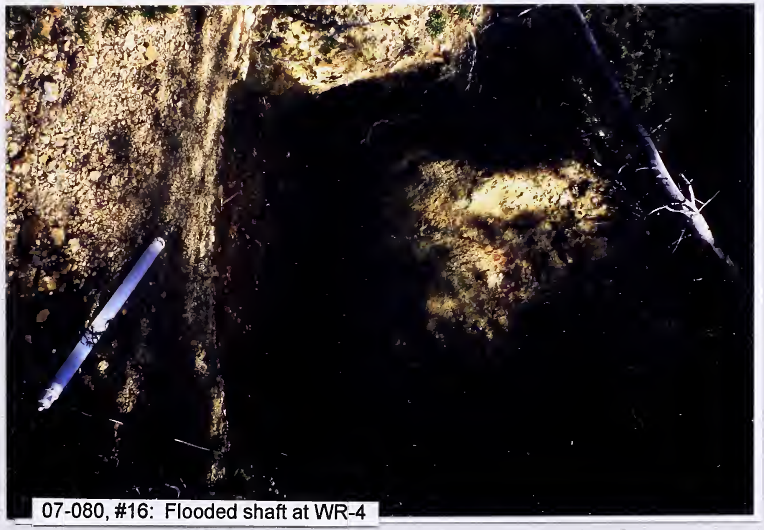
07-080, #11: WR-10

07-080, #12: WR-9

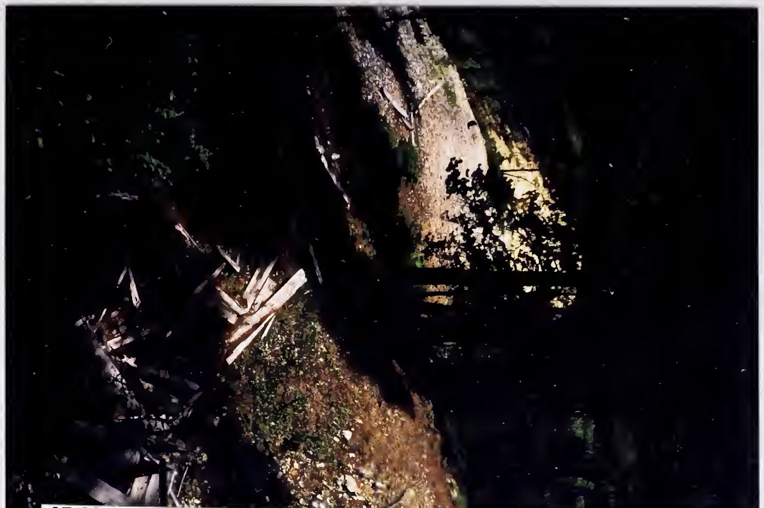
07-080, #13: WR-8

07-080, #14: WR-7 (left) and WR-6 (right)


07-080, #15: WR-4


07-080, #16: Flooded shaft at WR-4

07-080, #17: WR-3 and SW-2 sample location



07-080, #18: Caved shaft at WR-3

07-080, #19: WR-2

07-080, #20: WR-1

07-080, #21: SW-1 sample location

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: MOLTON **PA#:** 07-084

Date: July 29, 1993 **Time:** 1630-2030

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Pierson, TD&H
Clark, Pioneer

Visitors: None

Weather/Seasonality Observations: Partly cloudy; calm; approx. 70°F; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #22: Adit #1; #23: WR-1; #24: Adit #2; #25: WR-2; #26: Transformers; #27: WR-4; #28: WR-5; #29: Open stopes; #30: WR-3, west end; #31: WR-3, east end. Video Tape No. 4

General Comments/Observations (not covered specifically in attached Inventory Forms): N/A

Other Hazardous Materials/Substances Present: Six large transformers, PCB's possible; five 5 gal. barrels of lube oil; and, one 30 gal. barrel of unknown.

General Comments on Potential Remedial Alternatives: Isolate drainage from mine waste. Grade, amend, and revegetate dumps. Study AMD treatment alternatives.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): MOLTON PA#: 07-084

Legal Description: T 14N ;R 8E ;Sec. 29 , SW1/4 SE1/4 ___1/4

County: CASCADE Mining District: NEIHART

Latitude: N 46° 56' 21" Longitude: W 110° 44' 07"

Primary Drainage Basin and Code: Belt Creek/10030105
Secondary Drainage Basin: Rock Creek

USGS Quadrangle map name(s): Neihart

Mine Type/Commodities: Hardrock/Silver, Lead, Zinc

Activity Status: Active___,Inactive/Exploration X ,Abandoned___.

Ownership status: Known YX N__; private/public? Private/Public
Owner, Agent, or Contact(Include address and phone when available): Peter Antonioli, Alexandra Resources Co., P.O. Box 791, Butte, MT 59702. (406) 723-8730; Lewis and Clark National Forest.

Relationship to other mines/sites in the area/district: Near Unity & Rochester and Peabody mines. A fault connects Queen of the Hills, Molton, and Broadwater mines. Molton and Broadwater are owned by the same individual in recent years.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 5900' , Slope 10°-40° ,
Aspect Southwest

Land use: Mining X , Recreational X , Residential___, Urban___,
Agricultural___, Other(Specify)

Area of disturbed/unvegetated lands? Approx. 4 acres.
Dimensions:

Predominant vegetation types: Lodgepole pine

Access: roads - good___,poor X ,4wd___,trail___.
Other logistical considerations (proximity to other sites). Locked gate below the mine.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 3 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). The site is located on Rock Creek, which flows southwest, approx. 1/4 mile above its confluence with Belt Creek. Site is underlain by Pinto diorite, black mica schists, and pink and black gneiss.

Mining/milling history, ore type/tenor, host rock, gangue: Site was the largest producer in the area in 1893 and became inactive after 1901, then active again from 1918 to 1923. The ore is galena, together with pyrite and blend in a barite and quartz gangue. Average smelting ore ran 50-60 ounces silver/ton. The old mill was remodeled, but burned in May of 1921. Structures and equipment indicate that work was also conducted in the 1970's. Vein material is mainly altered country rock containing sulfides. Ore minerals are mainly galena and sphalerite with small amounts of chalcopyrite and pyrite. Mixed with this are proustite, pyrargyrite, pearceite, and polybasite. Ankerite, barite, rhodochrosite, and quartz are common gangue minerals.

Mine Operation?

Shafts - Yes X, No___, # 1, Comment Covered with concrete bulkhead

Adits - Yes X, No___, # 4, Comment Two hazardous stopes

Pits - Yes___, No X, # ___, Comment

Placers - Yes___, No X, # ___, Comment

Other - Yes___, No X, # ___, Comment

Mill Operation? Yes___, No X. If yes answer the next three questions:

Period(s) of Operation: N/A

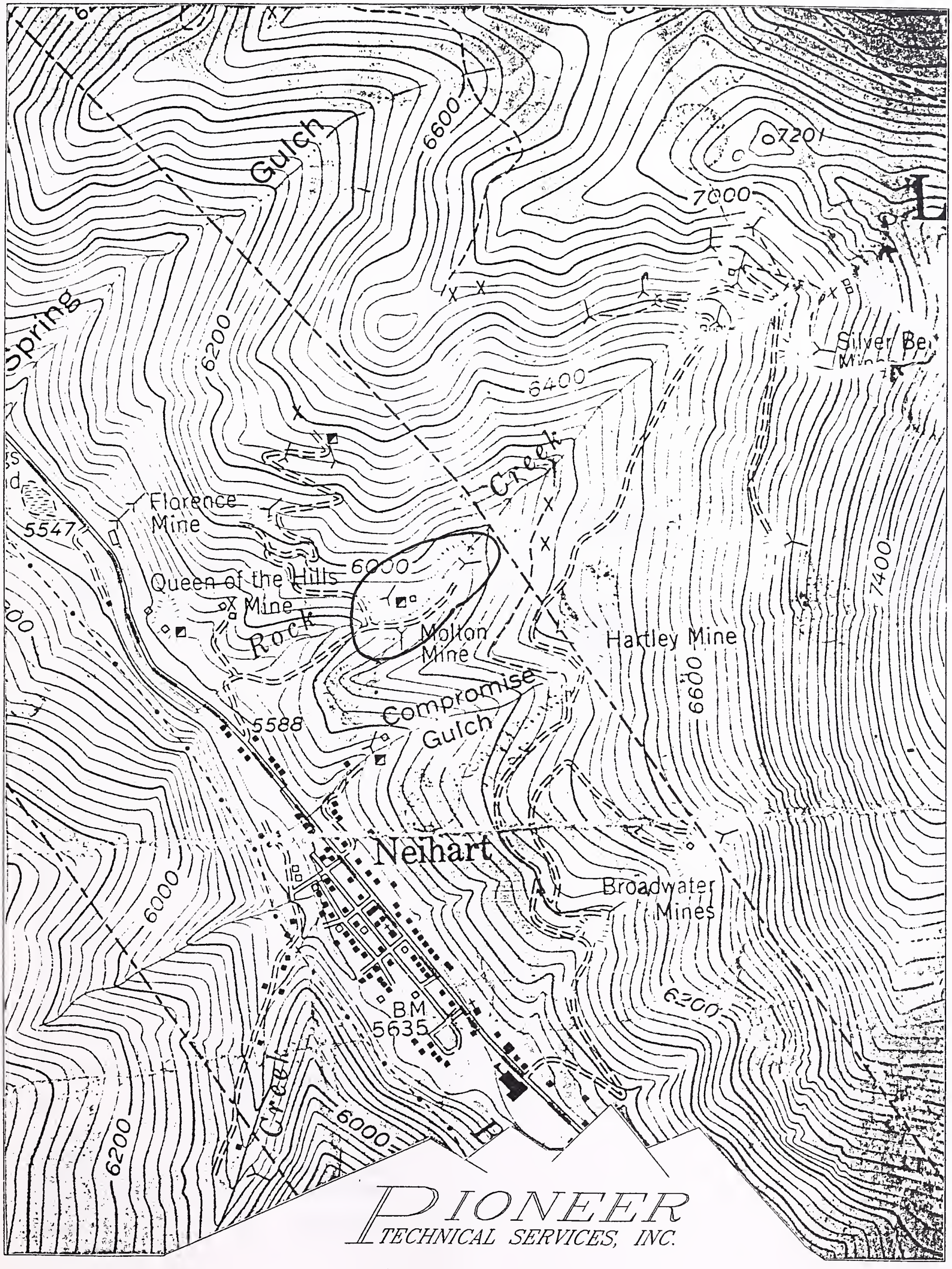
Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN$^-$ leach (vat, heap), floatation, smelting?
N/A

Montana Bureau of Mines and Geology
Water Well Log Data

11/10/1993

Well No.	Location	Depth	Yield	Static Water Level
M:123062	14N 08E 20 DBA	41.0	4.0	24.00
M:123061	14N 08E 20 DBA	40.0	7.0	0.00
M:25649	14N 08E 32 BDC	120.0	8.0	7.00

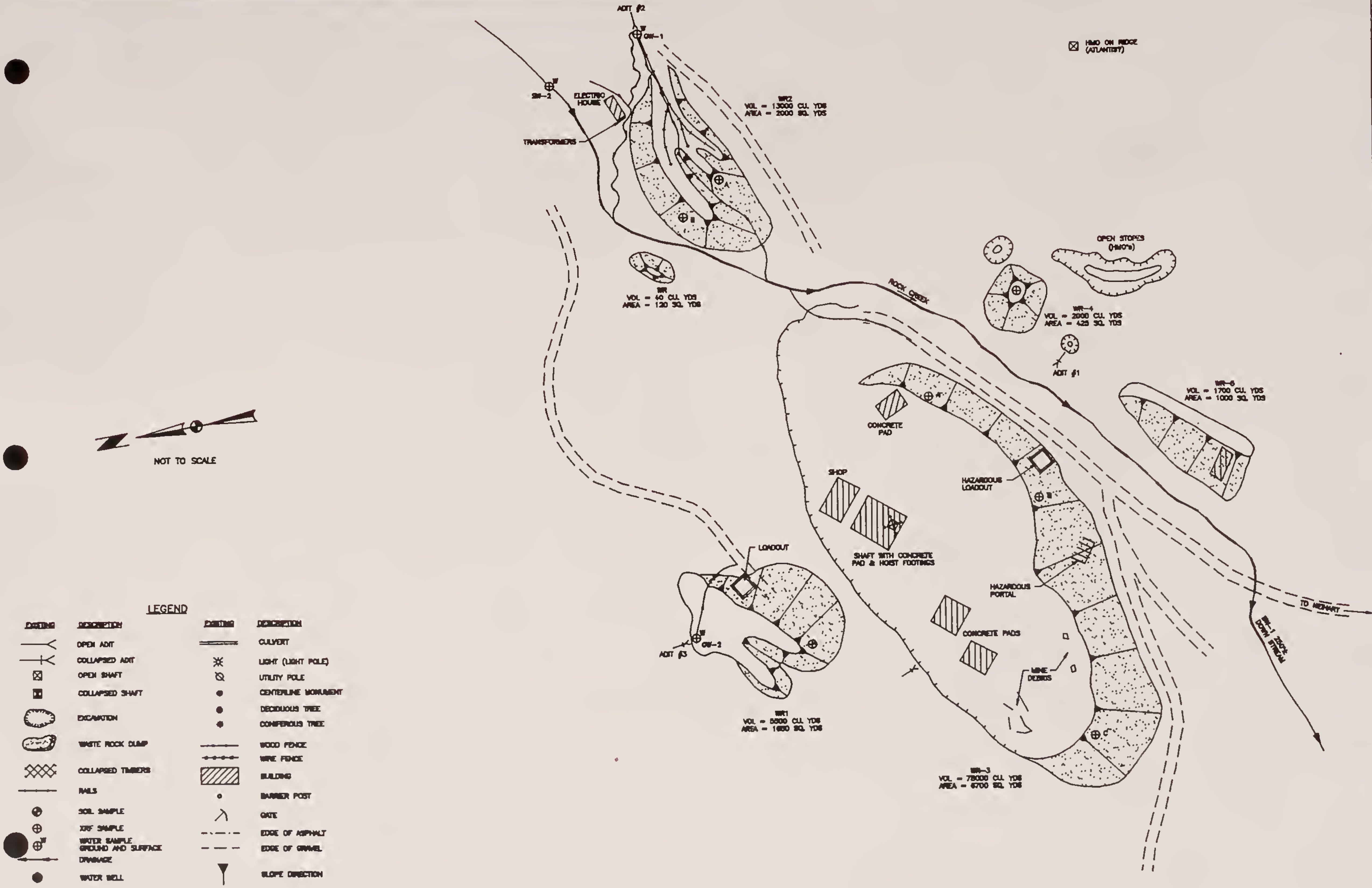


PIONEER
TECHNICAL SERVICES, INC.

MOLTON, P.A. NO. 07-084

T14N, R08E, SECTION 29

SCALE: 1" = 1000'



DRAWN MWC DATE 12/93
DESIGNED TPR JOB NO. 92-17
APPROVED F.B. NO.

PIONEER

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

MOLTON PA# 07-084
NEIHART DISTRICT CASCADE COUNTY

SHEET NO.

07-084.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Bullock, Clark

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1	WR	5,500	Dump on north side approx. 100 feet above shaft; west side of large south lobe	None	4.8 (D)	0.025	07-084-WR-1	07/29/93 1700	T-Metals, ABA
WR-2A	WR	13,040	Large discharging adit dump above (east) of shaft	None	6.6 (D)	0.06			
WR-2B	WR		Along Rock Creek	None	6.7 (D)	0.04			
WR-3A	WR	78,000	Large dump at main shaft; south end, orange medium sand	None	5.5 (D)	0.06	07-084-WR-2	07/29/93 1710	T-Metals, ABA
WR-3B	WR		Large dump at main shaft; near grizzly, brown sand	None	5.8 (D)	0.05			
WR-3C	WR		Large dump at main shaft; west end of dump, orange sand	None	5.5 (D)	0.065			
WR-4A	WR	2,000	Dump on south side of drainage across from WR-4; brown coarse sand	None	6.7 (D)	0.05			
WR-5	WR	1,700	South of WR-4 on east side of drainage	None	N/A	N/A	N/A	N/A	N/A

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 07-084-WR-1 is composite of WR-1A and WR-2A and -2B. 07-084-WR-2 is composite of WR-3A through -3C, and WR-4A.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes X , No___, Number:____ Identification: Adit #2 at WR-2; adit associated with WR-1

Filled shafts: Yes____, No X , Number:_____ Identification: Cemented shaft possibly flooded, but no releases evident.

Seeps/Springs: Yes___, No X , Number:____ Identification:____________

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 13

Distance to nearest well used for drinking? Approximately 1/4 mile

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable X , Possible____, Unlikely____.
Groundwater emanating from the workings exceeds aquatic life criteri
for Cu and Zn. Low pH and high SC in Adit #1 (GW-2).

Other observations/notes: N/A

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock, Pierson, Clark

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	Low pH	Partial	14,850	14,700	Yes	Low
WR-2	SO3	Partial	18,000	16,200	Yes	Low
WR-3	SO3	Partial	60,300	51,300	Yes	Moderate
WR-4	None	Dry	3,825	3,635	Yes	Low
WR-5	ND	Dry	9,000	9,000	Yes	Low
Adit #2	Algae	N/A	N/A	N/A	N/A	N/A
Adit #4	pH	N/A	N/A	N/A	N/A	N/A

Notes and Clarifications: ND = Not Determined

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_, Describe:____________________

Population within 1 mile: 1-10___; 10-30___; 30-100_X_; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments____________________

Evidence of recreational use on site: Yes___, No_X_, Describe:________

Accessibility - Fences, warning signs, closed roads? Gate on road below WR-3

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment____________
Wilderness Area - Yes___, No_X_, Comment____________
T&E Species Habitat - Yes___, No_X_, Comment____________
Bat Habitat - Yes___, No_X_, Comment____________

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High___, Medium_X_, Low___
Wetlands Frontage - High___, Medium___, Low_X_
Fisheries Habitat and Species Classification - Not Rated
Sport Fishery Classification - Not Rated

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_2_, types and locations: Stopes at WR-4

Hazardous structures: Yes_X_, No___, Number_5_, types and locations: Two mine buildings, two loadouts, and a portal

Unstable highwalls, pits, trenches, slopes: Yes_X_, No___, Number_2_, types and locations: One pit associated with stopes at WR-4; highwall at shaft area (WR-3)

Unstable waste piles, impoundments, undercut banks: Yes_X_, No____, Number_1_, types and locations: WR-3 is steep and eroding.

Fire and/or Explosion hazards: Yes_X_, No____, Explain: Petroleu
products stored within structures

SURFACE WATER INVENTORY FORM

SAMPLERS: Bullock, Pierson

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	Rock Creek downgradient 350 feet below WR-3	7.62	360	238	9.7	20	2.2 cfs (M)	07-084-SW-1	07/29/93 1815	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-1	SE	Rock Creek downgradient 350 feet below WR-3	N/A	N/A	N/A	N/A	N/A	N/A	07-084-SE-1	07/29/93 1815	T-Metals
SW-2	SW	Rock Creek approx. 100 feet above WR-2	7.56	330	98	8.3	14	4.9 cfs (M)	07-084-SW-2	07/29/93 1925	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-2	SE	Rock Creek approx. 100 feet above WR-2	N/A	N/A	N/A	N/A	N/A	N/A	07-084-SE-2	07/29/93 1925	T-Metals

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): Stream is impacted above this mine from upgradient sources (Rochester and Dakotah mines).

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
$pH \leq 5.0$	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 2 acres of relatively level ground below WR-3 prior to dropping off towards Belt Creek

Wetlands present: Yes___, No X, Describe:___

Carbonate rocks/soils: Yes___, No X, Describe:___

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X ; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments___

Nearest residence(ft or miles)? Approx. 700 feet

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

GROUNDWATER INVENTORY FORM

SAMPLERS: Bullock, Pierson

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
GW-1	AD	Adit at WR-2; Adit #2 is in drainage.	15 gpm (E)	7.9	450	156.8	5.0	105	N/A	07-084-GW-1	07/29/93 1910	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
GW-2	AD	Adit on north hill above shaft (WR-1)	15 gpm (E)	5.75	930	NM	5.8	2.0	N/A	07-084-GW-2	07/29/93 1953	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3

*FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): NM = Not Measured

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X , No ___, Name(s): Rock Creek

Dry streambeds: Yes ____, No X , Name(s):

Other surface water: Yes ____, No X , Name(s)/Description:

Waste materials within any floodplain: Yes X , No ___ Source ID(s): WR-2, WR-3, and WR-4

Approximate Flood frequency? X 1 yr, ___10 yr, ___100 yr

Estimated seasonal flow of stream(s) (cfs)? Approx. 3.5 cfs
High Flow: Approx. 20 cfs , Average Flow: Approx. 4 cfs

Distance between waste source(s) and nearest surface water body (ft)? 0 feet

Surface water draining onto or through waste sources: Yes X , No ____,
Describe: Stream cuts through WR-2 and around the toe of WR-3.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Irrigation, fishery, T&E - Bald Eagle

Observed erosional/sedimentation/stream turbidity problems? Yes X , No _____, Distance downstream (ft)? 1/4 mi Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
Stream is impacted for the extent of the drainage to its confluence with Belt Creek.

Bibliography

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MBMG, Molton Mine, Cascade County, Form 39, 1966, 1969-1971, 1974-1981, and 1984-1987.

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Molton, Prepared by Chen-Northern, September 16, 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Portal Inventory Form for Molton, Prepared by Daphne Digrindakis, June 13, 1985.

USGS, Geology of the Little Belt Mountains, 20th Annual Report, Written by W.H. Weed, Date Unknown, pp. 428-429.

USGS, Topographic Map, Neihart, Montana, 7 1/2 minute Quadrangle, 1961.

LABORATORY ANALYTICAL DATA

MOLTON
PA NO. 07-084

Molton PA# 07−084
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER − BULLOCK
INVESTIGATION DATE: 07/29/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
07−084−SE−1	102 J	348 J	62.5 J	35.1	25.7 J	123 J	34400	2.75 JX	16200	31	4440	21 J	11400 J	NR
07−084−SE−2	149 J	292 J	23.6 J	63.5	29 J	113 J	87500	0.351 JX	20400	34	5320	9 J	4890 J	NR
07−084−WR−1	79	470 J	24	10 J	7.4	40.8 J	31200	0.144 J	16000	24 J	4230 J	8 J	5290 J	NR
07−084−WR−2	274	889 J	3.6	5.7 J	42.6	165 J	37000	0.622 J	1230	19 J	4250 J	8 J	705 J	NR
BACKGROUND	53.3	828	15.3	11.6	72.7	50.1	30600	0.051 U	10400	91.5	5110	2.99 UJ	3530	NR

U − Not Detected; J − Estimated Quantity; X − Outlier for Accuracy or Precision; NR − Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
07−084−WR−1	1.77	55.3	29.7	−25.6	0.30	0.74	0.73	23.1	6.56
07−084−WR−2	0.86	26.9	12.3	−14.5	0.60	0.07	0.19	2.19	10.1

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
07−084−GW−1	2.64 J	20.3	2.83	9.7 U	6.83 U	1.55 U	199	0.13 J	1750	12.7 U	10	30.7 U	2610	204
07−084−GW−2	2.48 J	23.8	173	35.1	6.83 U	72.1	210	0.1 J	51000	231	775	43	33100	362
07−084−SW−1	2.93	22.8	34.3	9.7 U	6.83 U	11.5	582 J	0.094	5900	38.2	20.4 J	30.7 U	11000	130
07−084−SW−2	2.46	26.9	33.3	9.7 U	6.83 U	11.5	869 J	0.094	6890	33.3	21.8 J	30.7 U	11200	105

U − Not Detected; J − Estimated Quantity; X − Outlier for Accuracy or Precision; NR − Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2−N	CYANIDE
07−084−GW−1	516	< 5.0	4800	< 0.05	NR
07−084−GW−2	807	< 5.0	168	< 0.05	NR
07−084−SW−1	243	< 5.0	149	< 0.05	NR
07−084−SW−2	189	< 5.0	130	< 0.05	NR

LEGEND

SE1 − Rock Creek downgradient; 330' below waste rock dump 3.
SE2 − Rock Creek; approximately 100' above waster rock dump 2.
WR1 − Composite of subsamples WR1A, 2A, and 2B.
WR2 − Composite of subsamples WR3A, 3B, 3C, and 4A.
BACKGROUND − From the Compromise Mine (07−100−SS−1).
GW1 − Adit at waste rock dump 2 (Adit #2).
GW2 − Adit on North hill above shaft.
SW1 − Same as sample SE1.
SW2 − Same as sample SE2.

XRF ANALYSIS RESULTS

MOLTON
PA NO. 07-084

Mine Name: Molton PA# 07-084
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
07-084-WR1-A		25634.7	2608	1431.79		9114.88	54530.1		96.7958 *	1827.24		211.317
07-084-WR2-A	307.604 *	29024.4	5146.5	1814.78	201.309 *	11417.5	27299.9		43.4592 *	1539.94		85.8672
07-084-WR2-B		35631.2	7636.02	2923.06		27904.5	44800.1		160.935 *	6298.25		64.4737
07-084-WR3-A	305.262 *	28365	10415.8	1203.61	205.77 *	414.597 *	37433.6		127.702 *	493.72		158.463
07-084-WR3-B	529.624 *	14479.1	16341.5	2388.33	263.927 *	3674.02	40282.4		48.516 *	699.322		92.9038
07-084-WR3-C		26106.4	13239	1623.73		549.663 *	58502.7		405.458	786.005		89.2707
07-084-WR4-A		22427.9	2088.57	1736.77		10552.6	70060.5		245.13	1805.31		102.491
07-084-WR-1-COMP	542.5 *	26456	6389.34	2347.5	268.997 *	13491.3	34645.4		66.7686 *	3395.3		76.9221
07-084-WR-2-COMP	398.918 *	24057.6	6187.47	1716.73		2614.43	42063.1	329.224 *	163.983 *	909.948		116.43

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
07-084-WR1-A	236.817		26.6588 *	2881.61	137.114	138.64 *		1686.71	102.305 *	17.6481 *	19.1403 *
07-084-WR2-A	95.3595			1412.21	179.901			1702.6			12.5798 *
07-084-WR2-B	123.477			4552.44	218.523			2157.38	378.605		
07-084-WR3-A	140.428		7.54554 *	3166.27	173.884			4035.95	124.279 *		16.8279 *
07-084-WR3-B	136.31			327.709	73.0192			631.457		12.1074 *	13.6567 *
07-084-WR3-C	115.649		17.7401 *	6354.91	190.333			2358.13			20.2313 *
07-084-WR4-A	342.774		14.9679 *	3878.26	143.105			2113.72	224.041 *		24.2185 *
07-084-WR-1-COMP	95.1292		20.0918	3137.75	164.036			1088.7	110.106 *		15.5823 *
07-084-WR-2-COMP	183.547		5.69003 *	3395.38	139.189			2215.26		10.7708 *	

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

MOLTON
PA NO. 07-084

AIMSS SCORESHEET

SITE NAME: MOLTON
PA NUMBER: 07-084

GROUNDWATER PATHWAY

LINE NO.				
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	21.903
6	GW - TARGETS	WELLS - 1 MI. x 2.5		7.5
7		WELLS - 1 TO 4 MI		10
8		NEAREST WELL		5
9		TARGETS SCORE	LINES 6 + 7 + 8	22.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	197127

SURFACE WATER PATHWAY

11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		300
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	700
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	23.587
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		1
18		WETLANDS		0
19		FISHERY		0
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 - 22	8
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	132087

AIR PATHWAY

25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		15
26B		DISTANCE TO POPULATION		20
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	300
27		LIKELIHOOD SCORE	LINES 25 + 26C	300
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.028
29	AIR - TARGETS	POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		10
31		WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 - 33	40
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	336

DIRECT CONTACT PATHWAY

36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		0
37A		ACCESSIBILITY		10
37B		DISTANCE TO POPULATION		20
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	200
38		LIKELIHOOD SCORE	LINES 36 + 37C	200
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.027
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		30
41		NEAREST RESIDENCE		10
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 - 42	40
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	216

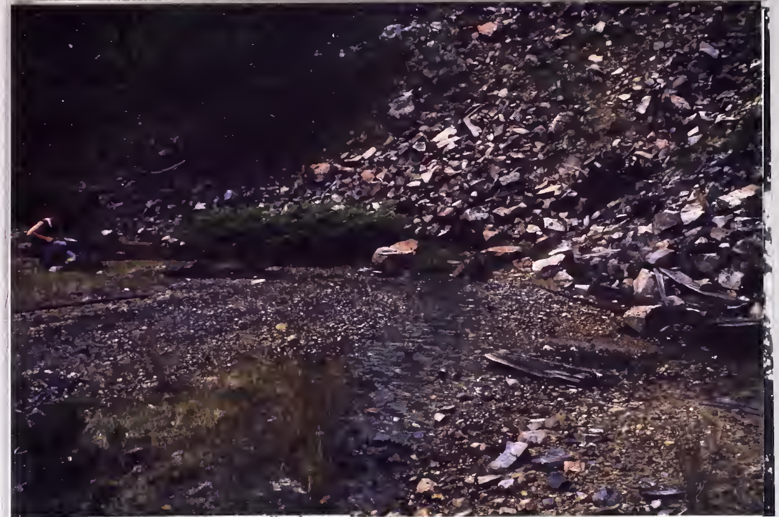
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000	**3.30**

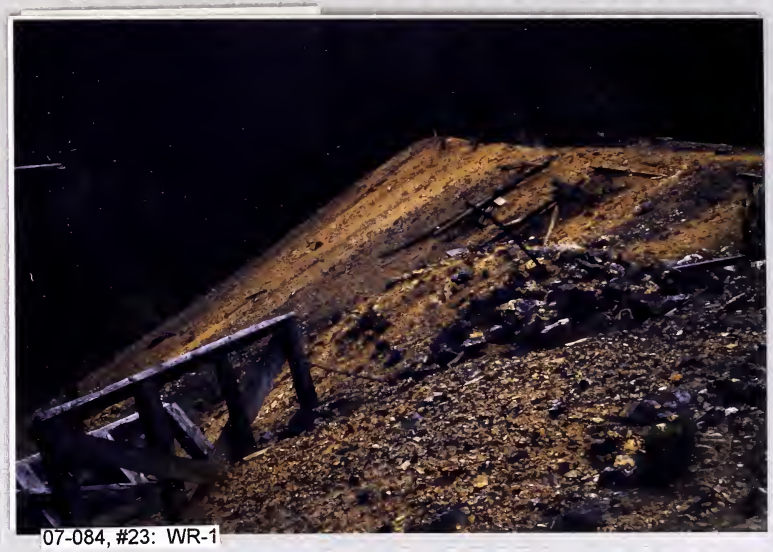
SITE NAME: MOLTON

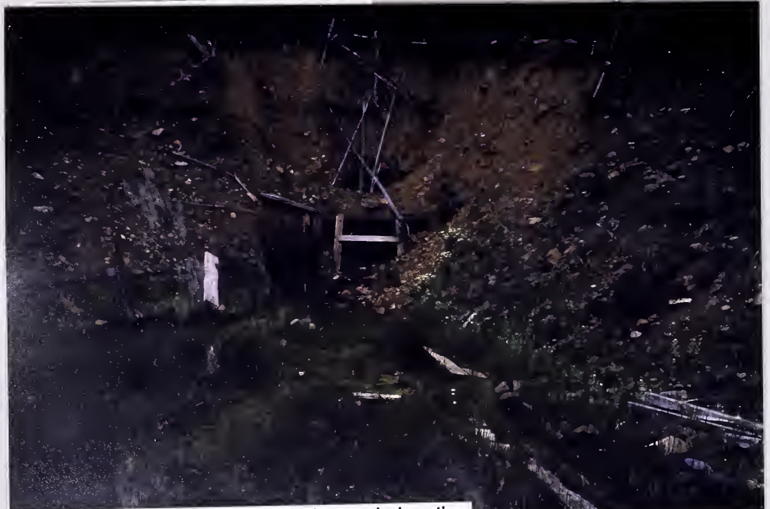
PA NUMBER: 07-084

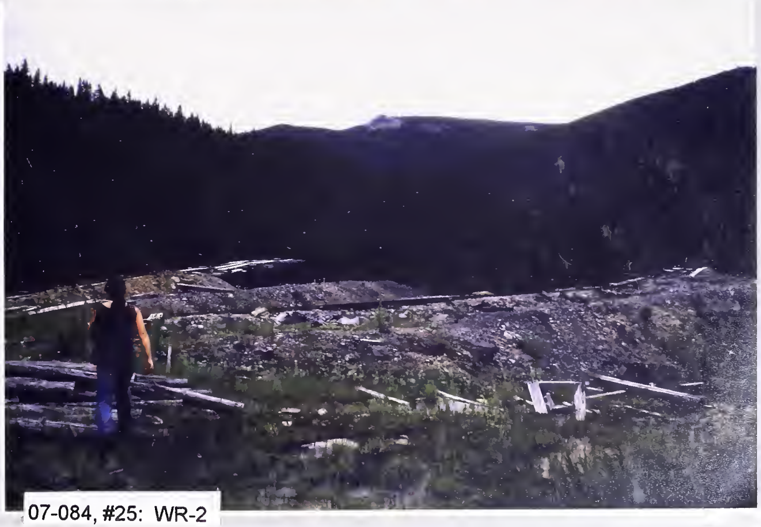
SITE SAFETY

LINE NO.				
1	THREAT	ACCESSIBILITY		10
2		OPEN SHAFTS	100 EA.	200
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	150
5		HAZ. STRUCTURES	40 EA.	200
6		EXPLOSIVES		0
7		HAZ. MATERIALS		100
8		HAZARDS SCORE	SUM LINES 2 - 7	650
9		POPULATION - 1 MILE		30
10	TARGETS	NEAREST RESIDENCE		10
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 - 11	40
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**260.00**


07-084, #22: Adit #1 with discharge


07-084, #23: WR-1


07-084, #24: Adit at WR-2; GW-1 sample location


07-084, #25: WR-2

07-084, #26: Transformers at WR-2

07-084, #27: WR-4

07-084, #30: WR-3 and loadout, facing west

07-084, #31: WR-3 at east end

07-084, #32: SW-1 sample location

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY
SITE INVESTIGATION LOG SHEET

Mine/Site Name: EVENING STAR MINE AND MILLSITE **PA#:** 07-087

Date: June 2, 1993 **Time:** 1600

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Flammang, Pioneer
Clark, Pioneer

Visitors: None

Weather/Seasonality Observations: Partly cloudy; cool (50°F); slight breeze; light showers.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #20: Adit #1; #21: Deer drinking water from standing water on TP-1; #22: Deer eating grass on TP-1; #23: Auger profile of TP-1; #24: Mill.
Video Tape No. 2

General Comments/Observations (not covered specifically in attached Inventory Forms): Could not locate older tailings; may have been slurried down to the creek.

Other Hazardous Materials/Substances Present: In lower gray metal building: 2 bags soda ash; 55 gal. drum, 1/2 full of unknown; two 11 polyachylamide flocculent, 50 lbs.; zinc sulfate monohydrate, 25 lbs.; unknown white powder. In lowest gray building: two 55 gal. drums, unknown; one 55 gal. nitro dro-phosphate in water marked "D002"; one 55 gal. drum sodium isopropyl xanthate; two 55 gal. drums bromated aqueous dithiophos marked "D002", cyanamid aero marked "3477"; one bag zinc sulfate mono hydrate; three 55 gal. barrels, unknown contents and amounts; all barrels are in bad condition.

General Comments on Potential Remedial Alternatives: Study treatment requirements/alternatives for the adit discharge. Grade, amend, and revegetate waste rock dumps and tailings. Properly dispose of hazardous chemicals and raze mill structure.

MDSL AMRB/PIONEER 4/9/93

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): EVENING STAR MINE AND MILLSITE PA#: 07-087

Legal Description: T 14N ;R 8E ;Sec. 29 , NW1/4 SW1/4 ___1/4

County: CASCADE Mining District: NEIHART

Latitude: N 46° 56' 39" Longitude: W 110° 44' 46"

Primary Drainage Basin and Code: Belt Creek/10030105
Secondary Drainage Basin: Belt Creek

USGS Quadrangle map name(s): Neihart

Mine Type/Commodities: Hardrock/Silver, Lead, Zinc

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N___; private/public? Public
Owner, Agent, or Contact(Include address and phone when available): USFS; Caboose Mining, Helena, MT 59601.

Relationship to other mines/sites in the area/district: In close proximity to the Morning Star and London mills.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 5600' , Slope 0°-40° ,
Aspect Southwest

Land use: Mining X , Recreational X , Residential___, Urban___,
Agricultural___, Other(Specify)

Area of disturbed/unvegetated lands? Approx. 6.5 acres.
Dimensions:

Predominant vegetation types: Lodgepole pine, aspen, willows, grasses, raspberry, kinnikinick, strawberry

Access: roads - good X ,poor___,4wd___,trail___.
Other logistical considerations (proximity to other sites).

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 3 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies on the northeast side of Belt Creek on the opposite side of highway. Belt Creek is the major drainage for the area. Water from the site flows under highway through culverts southwest to Belt Creek, which flows north-northwest away from the site. The site is underlain by Pre-beltian gneiss and schist.

Mining/milling history, ore type/tenor, host rock, gangue: Mine operated from 1913 to 1943; it reopened in 1969 and was listed as inactive by 1974. From 1901 to 1948 inclusive, the mine produced 54,610 tons of ore.

Mine Operation?
Shafts - Yes___, No X , # ___, Comment___
Adits - Yes X , No___, # 1 , Comment Caved
Pits - Yes___, No X , # ___, Comment___
Placers - Yes___, No X , # ___, Comment___
Other - Yes___, No X , # ___, Comment___

Mill Operation? Yes X , No___. If yes answer the next three questions:

Period(s) of Operation: 1913 to 1922; 1933 to 1939; 1939 to 1945; and, 1970 to 1974

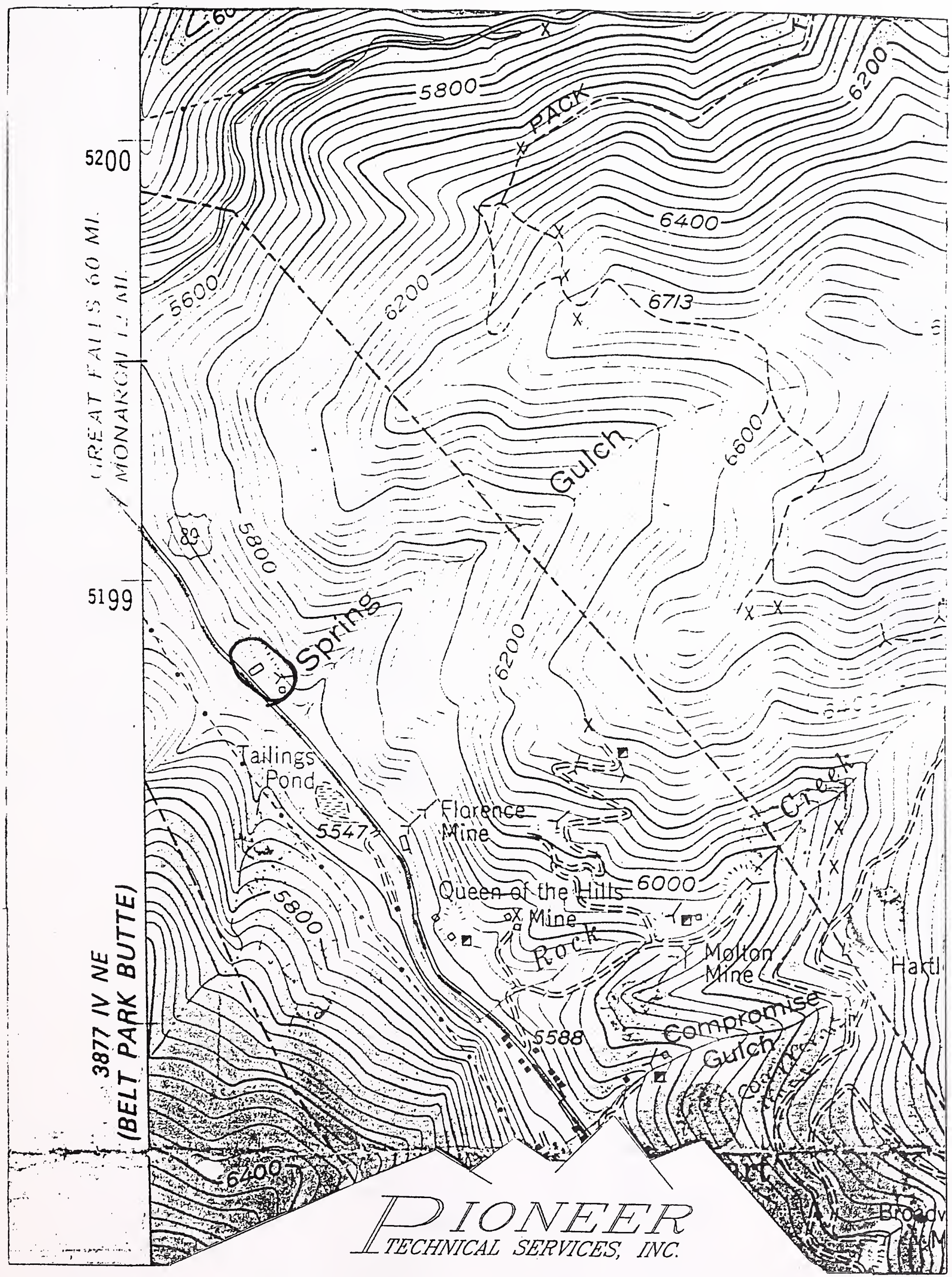
Origin of Ore Milled - Custom Mill___ Dedicated Mill X ; Number and names of mines that supplied mill feed: Unspecified in the literature, but is probably dedicated.

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting? Floatation from 1939 to unknown; a 50-ton bulk floatation mill was built. No information previous to 1939.

Montana Bureau of Mines and Geology
Water Well Log Data

10/22/1993

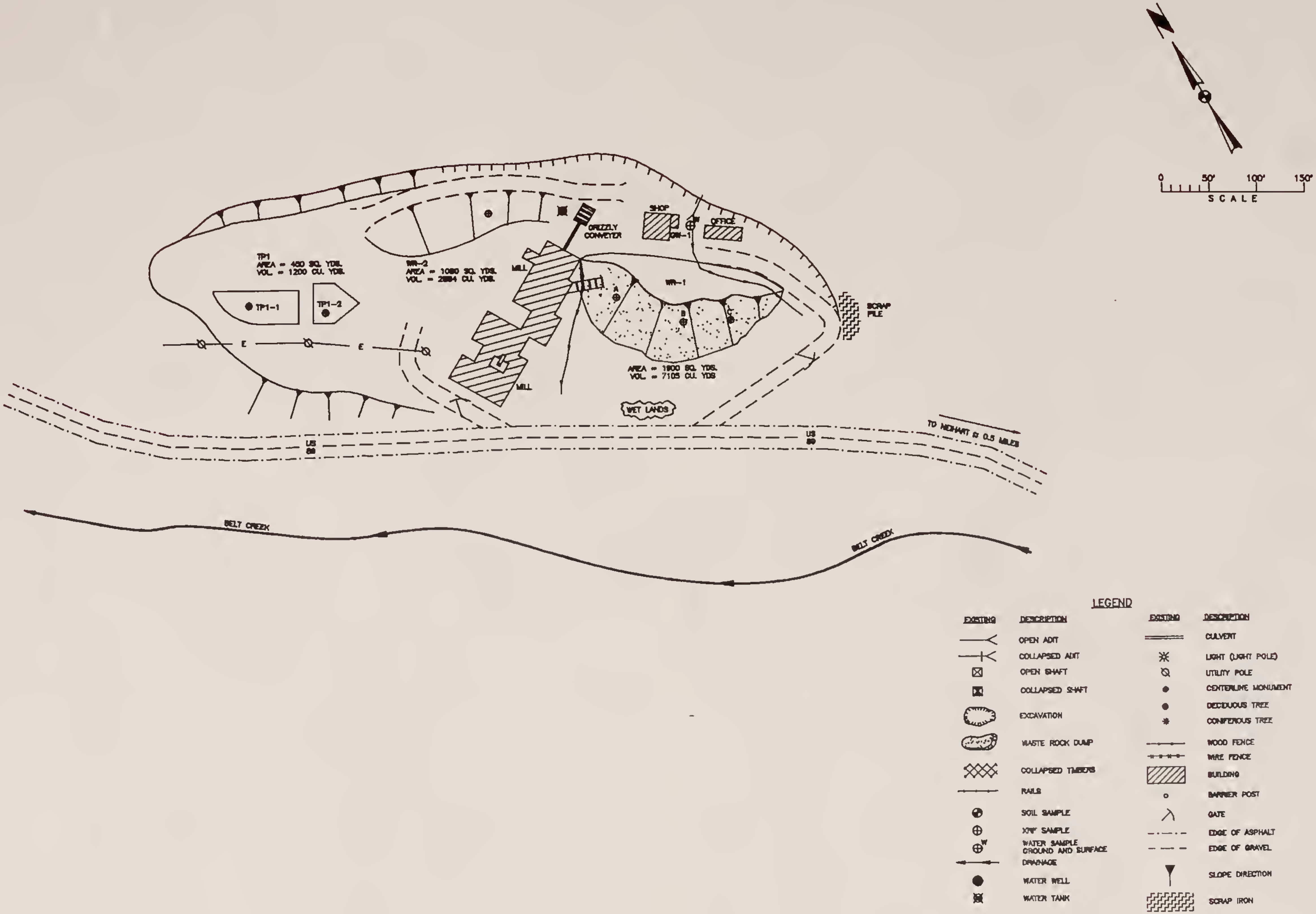
Well No.	Location	Depth	Yield	Static Water Level
M:123062	14N 08E 20 DBA	41.0	4.0	24.00
M:123061	14N 08E 20 DBA	40.0	7.0	0.00
M:25649	14N 08E 32 BDC	120.0	8.0	7.00



PIONEER
TECHNICAL SERVICES, INC.

EVENING STAR MINE AND MILL, P.A. NO. 07-087

T14N, R08E, SECTION 29
SCALE: 1" = 1000'



DRAWN MWC DATE 8/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

PIONEER TECHNICAL SERVICES, INC. BUTTE, MT.

TD&H

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS-BOZEMAN-KALISPELL MONTANA
SPOKANE WASHINGTON

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY
EVENING STAR PA# 07-087
NEIHART DISTRICT CASCADE COUNTY

SHEET NO.

07-087.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): 100% fine clay

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): Slight color change from tan to light gray approx. 6" to 1' bgs representing oxidized and reduced conditions.

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): Currently wet

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): Apparently very good; some woven mesh liner around parameter may indicate attempts were made to line the impoundments.

Comments on potential for mitigation: Capping or amendment and revegetation.

SOURCE INVENTORY FORM

SAMPLERS: Bullock, Flammang, Clark

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	7,100	Northern most hole in WR-1	None	5.2 (D)	0.05	07-087-WR-1	06/02/93 2030	T-Metals, ABA
WR-1B	WR		Center hole in WR-1	None	5.5 (D)	0.04			
WR-1C	WR		Southern most hole in WR-1	None	< 3.5 (D)	0.04			
WR-2	WR	2,884	Waste rock north of mill building; near top	None	6.0 (D)	0.04	07-087-WR-2	06/02/93 2030	T-Metals, ABA
Mill	OTH	N/A	Inside mill building; soil from floor	In building	5.8 (D)	0.04			
TP-1A	TAIL	1,200	Pond near standing water; tan clay, 0'-1'	Good	3.9 (D)	0.04	07-087-TP-1	06/02/93 2011	T-Metals, ABA, CN-
TP-1B	TAIL		Light medium gray clay; 1'-4'	Good	3.6 (D)	0.04			
TP-1C	TAIL		Dark brown loam; 4'-4.5'	Good	4.8 (D)	0.04			
TP-2A	TAIL		Unvegetated part of west part of pond; 0"-8"	Good	5.6 (D)	0.04			

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 07-087-WR-1 is composite of WR-1A through -1C. 07-087-WR-2 is grab of WR-2. 07-087-TP-1 is composite of all tailings samples.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes X , No___, Number: 1 Identification: Adit #1

Filled shafts: Yes___, No X , Number:____ Identification:____

Seeps/Springs: Yes X , No____, Number: 1 Identification: Small wetlands below WR-1 is probably due to adit discharge seepage from toe of dump.

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 13

Distance to nearest well used for drinking? Approx. 0.5 mile

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable X , Possible____, Unlikely____.
Discharging adit flows through waste rock material.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: Bullock, Flammang

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
GW-1	AD	Evening Star adit	40 gpm (M)	6.48	900	207	7.2	274	N/A	07-087-GW-1	06/02/93 1830	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X, No___, Name(s): Belt Creek

Dry streambeds: Yes___, No X, Name(s):___

Other surface water: Yes X, No___, Name(s)/Description: Standing water on TP-1 and discharge from Adit #1. Also small wetlands at toe of WR-1.

Waste materials within any floodplain: Yes X, No___ Source ID(s): Site may lie partially within the 100 year floodplain.

Approximate Flood frequency? ___1 yr, ___10 yr, X 100 yr

Estimated seasonal flow of stream(s) (cfs)?___
High Flow: 100+ cfs, Average Flow: 10 cfs

Distance between waste source(s) and nearest surface water body (ft)? Adit #1 discharge flows over WR-1; standing water on TP-1.

Surface water draining onto or through waste sources: Yes X, No___,
Describe: See above

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?) Fishery, stock watering

Observed erosional/sedimentation/stream turbidity problems? Yes___, No X, Distance downstream (ft)?___ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): None directly from this site.

SURFACE WATER INVENTORY FORM

SAMPLERS: ______________________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.											

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______________________________

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)?_Two acres; adit discharge could be diverted to tailings impoundment area which could be converted to wetlands.___

Wetlands present: Yes_X_, No___, Describe:_Approx. 1/8 acre at base of site between site and highway___

Carbonate rocks/soils: Yes___, No_X_, Describe:___

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100_X_; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments___

Nearest residence(ft or miles)?_Approx. 0.5 mile___

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock, Flammang, Clark

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	SO4; pH	Dry	17,100	17,100	Yes	Low
WR-2	SO4; pH	Dry	9,720	9,720	Yes	Low
TP-1	pH	Wet	4,050	3,040	Yes	Low

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X__,
Describe:____

Population within 1 mile: 1-10___; 10-30___; 30-100_X_; 100-300___;
300-1,000____; 1,000-3,000____; 3,000-10,000____; 10,000 or greater___;
Comments____

Evidence of recreational use on site: Yes___, No_X_, Describe:_______

Accessibility - Fences, warning signs, closed roads? Gate on road, but access just off of highway.

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment____________
Wilderness Area - Yes___, No_X_, Comment____________
T&E Species Habitat - Yes___, No_X_, Comment____________
Bat Habitat - Yes_X_, No___, Comment Open adit

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High_X_, Medium___, Low___
Wetlands Frontage - High___, Medium_X_, Low___
Fisheries Habitat and Species Classification - 3
Sport Fishery Classification - 3

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_1__, types and locations:___
Adit #1

Hazardous structures: Yes_X_, No___, Number_9__, types and locations:_
Adit covering, tank above adit, mill and decking, water tank, loadout, two floatation tanks, lower gray building, and cribbing.

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____,
types and locations:___________________________________

Unstable waste piles, impoundments, undercut banks: Yes_X_, No____,
Number_1__, types and locations: WR-1 is steep (at angle of repose).

Fire and/or Explosion hazards: Yes_X_, No___, Explain: Possible due to chemicals left in the mill structure.

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB, Environmental Assessment Data for Evening Star, Prepared by MSE, Inc., October 4 and 29, 1990.

MDSL/AMRB, Environmental Assessment for Evening Star Mine and Mill, Prepared by GCM, Inc., February 1991.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Evening Star Mine and Mill, Prepared by Chen-Northern, September 12, 1989.

USGS, Topographic Map, Neihart, Montana, 7 1/2 minute Quadrangle, 1961.

LABORATORY ANALYTICAL DATA

EVENING STAR MINE AND MILLSITE
PA NO. 07-087

MDSL AMRB/PIONEER 4/9/93

Evening Star Mill PA# 07−087
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER − BULLOCK
INVESTIGATION DATE: 06/02/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
07−087−TP−1	104	4150	32.1	6.49	29.3	98.1	30000	0.277	11000	90.9	5860	5.47 J	7730	1.371 U
07−087−WR−1	86.3	233	26.6	13.4	10.6	160	45000	0.301	12000	87.5	14800	3.58 J	6840	NR
07−087−WR−2	34 J	640 J	7.9	17.5	35.5 J	46.3 J	34700	0.186	8150	93.4	5370	6.56 J	1910	NR
BACKGROUND	53.3	828	15	11.6	72.7	50.1	30600	0.051 U	10400	91.5	5110	2.99 UJ	3530	NR

U − Not Detected; J − Estimated Quantity; X − Outlier for Accuracy or Precision; NR − Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
07−087−TP1	1.24	38.7	28.6	−10.	0.26	0.68	0.3	21.2	7.36
07−087−WR1	2.47	77.2	34	−43.	0.28	1.22	0.97	38.1	−4.14
07−087−WR2	0.76	23.7	64.6	40.8	0.23	0.24	0.29	7.5	57.1

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
07−087−GW−1	0.98 U	6.4	2.55 U	5.99 U	8.93 J	3.23 J	184	0.038 U	8560	86.8	6.64	18.3 U	606 JX	489

U − Not Detected; J − Estimated Quantity; X − Outlier for Accuracy or Precision; NR − Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2−N	CYANIDE
07−087−GW−1	613	< 5.0	215	< 0.05	NR

LEGEND

TP1 − Composite of subsamples TP2A, 1A, and 1B.
WR1 − Composite of subsamples WR1A, 1B, and 1C.
WR2 − Sample of the WR2 subsample.
BACKGROUND − From the Compromise Mine (07−100−SS−1).
GW1 − Sample from the Evening Star adit.

XRF ANALYSIS RESULTS

EVENING STAR MINE AND MILLSITE
PA NO. 07-087

Mine Name: Evening Star PA# 07-087
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
07-087-MILL		1557.01	3650.03	89.9165 *		1095.62 *	18711.6	441.798 *	864.893	25189.6		48.204 *
07-087-TP1-1A		29896.6	4354.52	1198.94		11616.8	24045			4999.25		251.318
07-087-TP1-1B		38437	6433.98	1901.72		13046.1	28163.6			6275.54		303.177
07-087-TP1-1C		10288.3	27783.5	726.776	154.216 *	635.282 *	12902.7			179.75 *		171.083
07-087-TP1-2A		34145.6	5350.51	1464.89		13240.9	32319.2		91.8155 *	7848.48		280.06
07-087-TP-1-COMP		37795.2	5493.54	1681.68		12383.9	28481.1		109.804 *	6239.17		272.888
07-087-WR2-A	424.585 *	26545.9	8068.48	2211.85	152.053 *	6581.95	32873.4			2013.18		166.071
07-087-WR-1A	215 $	31762 $	4237 $	1529 $	81 $	17447 $	40136 $		182 $	4054 $		75 $
07-087-WR-1B		14822 $	8504 $	2951 $	60 $	11731 $	46012 $		39 $	1507 $		115 $
07-087-WR-1C		11355 $	1049 $	3787 $		4568 $	42278 $		20 $	271 $		314 $
07-087-WR-1-COMP	333 $	35240 $	8355 $	2789 $		14625 $	46073 $		155 $	3017 $		156 $
07-087-WR-2-COMP		31079.2	5462.28	1995.76		12217.9	41922.9		101.281 *	4481.49		114.679

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
07-087-MILL	25.01 *			33857.1	39.6905 *	192.9 *	63.4243 *	531.265	487.728		59.285 *
07-087-TP1-1A	186.811		7.5313 *	3175.83	148.179			8432.29	105.044 *		25.6869 *
07-087-TP1-1B	209.724			3367.96	152.839	125.309 *		9813.74	79.7923 *	17.8938 *	16.5597 *
07-087-TP1-1C	116.986			130.715	52.5971			210.08	58.6962 *		
07-087-TP1-2A	188.608			5552.79	170.633			9687.59	100.617 *		23.1256 *
07-087-TP-1-COMP	245.377			3475.14	157.995			8946.58	127.038 *	19.4149 *	19.4982 *
07-087-WR2-A	109.228			1572.15	182.605			1695.83	115.395 *		
07-087-WR-1A	135 $		3 $	10422 $	159 $	131 $	40 $	1655 $	143 $	15 $	
07-087-WR-1B	66 $		3 $	4319 $	90 $		23 $	501 $	72 $		
07-087-WR-1C	133 $		2 $	131 $	58 $		31 $	547 $	60 $	4 $	3 $
07-087-WR-1-COMP	173 $			8020 $	156 $	173 $	28 $	1775 $	145 $	9 $	13 $
07-087-WR-2-COMP	144.354			7580.42	166.334			1443.86	133.128 *		

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

EVENING STAR
PA NO. 07-087

AIMSS SCORESHEET

SITE NAME: EVENING STAR MINE/MILL
PA NUMBER: 07-087

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	34.009
6	GW - TARGETS	WELLS - 1 MI. x 2.5		7.5
7		WELLS - 1 TO 4 MI		10
8		NEAREST WELL		5
9		TARGETS SCORE	LINES 6 + 7 + 8	22.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	306081
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	400
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	37.189
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		5
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 - 22	22
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	327263
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		10
26B		DISTANCE TO POPULATION		10
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	100
27		LIKELIHOOD SCORE	LINES 25 + 26C	100
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	1.112
29	AIR - TARGETS	POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		5
31		WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 - 33	45
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	5004
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		0
37A		ACCESSIBILITY		10
37B		DISTANCE TO POPULATION		10
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	100
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	1.009
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		30
41		NEAREST RESIDENCE		5
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 - 42	35
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	3532
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**6.42**

SITE NAME: EVENING STAR MINE/MILL
PA NUMBER: 07-087

LINE NO.		SITE SAFETY		
1	THREAT	ACCESSIBILITY		10
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	50
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	360
6		EXPLOSIVES		50
7		HAZ. MATERIALS		100
8		HAZARDS SCORE	SUM LINES 2 - 7	560
9		POPULATION - 1 MILE		30
10	TARGETS	NEAREST RESIDENCE		5
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 - 11	35
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**196.00**

SUMMARY OF HISTORICAL ANALYTICAL DATA FROM OTHER SOURCES

REPORT DATE: October 4, 1990

CLIENT: Abandon Mines

FIELD ID: Evening Star Site Discharge Access Roadway (into Bait creek)

LAB NO: W8564

DATE RECEIVED: 09-14-90

Hardness 479 mg/L as $CaCO_3$

Total Extractable Metals

As <0.001 mg/L

Cd <0.0001 mg/L

Cu <0.01 mg/L

Fe 0.17 mg/L

Pb 0.019 mg/L

Zn 0.04 mg/L

REPORT DATE: October 4, 1990

CLIENT: Abandon Mines

FIELD ID: Evening Star Adit

LAB NO: W8563

DATE RECEIVED: 09-14-90

Hardness 463 mg/L as $CaCO_3$

Total Extractable Metals

As <0.001 mg/L

Cd 0.0012 mg/L

Cu <0.01 mg/L

Fe 0.20 mg/L

Pb 0.002 mg/L

Zn 0.95 mg/L

DATE: October 29, 1990

CLIENT: Abandoned Mines

FIELD ID: Evening Star Mill Tailings--08/15/90

LAB NO: S2701

DATE RECEIVED: 09-24-90

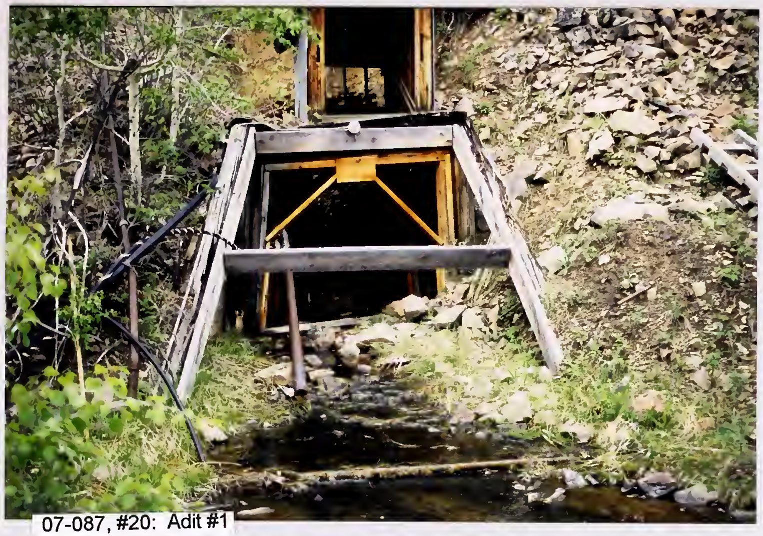
pH (1:1 slurry) 7.00 SU

Total Metals

As	141	mg/Kg
Cd	33	mg/Kg
Cu	56	mg/Kg
Fe	30,800	mg/Kg
Pb	4690	mg/Kg
Zn	7820	mg/Kg

SITE NAME: EVENING STAR MINE/MILL
DATE: 15-Aug-90

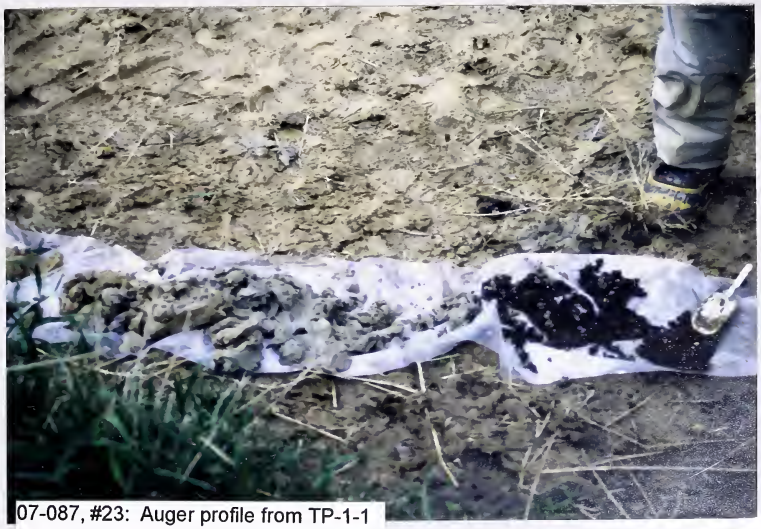
STATION	FLOW (gpm)	pH (s.u.)	SPECIFIC CONDUCTANCE (umhos/cm)	TEMP. (celcius)	COMMENTS
ADIT	15	7.04	600	8.9	SAMPLE COLLECTED, SOME ADIT DISCHARGE IS PIPE
PIPE	4	7.32	600	10.4	PIPED FROM ADIT, NOW DUMPS ONTO WAS
PIPE (TO BELT CK)	1.5	9.05	820	22.5	DISCHARGE FROM MILL AREA PIPED UNDER THE HIGHWAY, DISCHARGED TO BELT CK. SAMPLE COLLECTED.



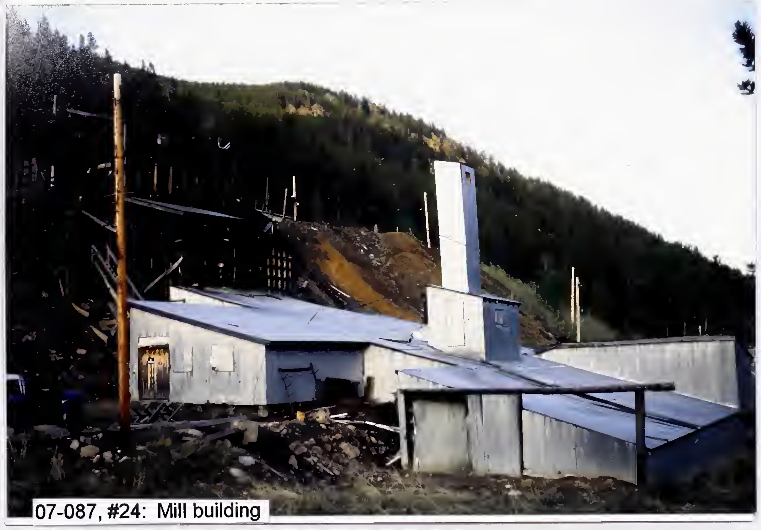
07-087, #20: Adit #1

07-087, #21: TP-1; deer drinking water from pond

07-087, #22: Deer eating grass on TP-1



07-087, #23: Auger profile from TP-1-1



07-087, #24: Mill building

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: COMPROMISE PA#: 07-100

Date: June 1, 1993 Time: 1015-1900

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Flammang, Pioneer
Clark, Pioneer

Visitors: None

Weather/Seasonality Observations: Cool (approx. 50°F); raining moderate to hard.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #1: SW-3 upgradient sample location; #2: WR-5 previously unidentified adit and dump; #3: WR-6; #4: Adit #2, GW-3 sample location; #5: Shaft #1, GW-1 sample location; #7: WR-1; #8: WR-2; #9: WR-3 from Adit #1; #10: Adit #1, GW-2 sample location; #11: Cabin and drainage; #12: SW-1 downgradient sample location. No video was taken.

General Comments/Observations (not covered specifically in attached Inventory Forms): 1015 Arrived at site; 1030 Walk through and H&S meeting, identified one adit and dump not listed on inventory approx. 200' north of Adit #2.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Study water treatment alternatives. Isolate dump material from drainage, grade, amend, and revegetate.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): COMPROMISE PA#: 07-100

Legal Description: T 14N ;R 8E ;Sec. 32 , NW1/4 NE1/4 ___1/4

County: CASCADE Mining District: NEIHART

Latitude: N 46° 56' 16" Longitude: W 110° 44' 05"

Primary Drainage Basin and Code: Belt Creek/10030105
Secondary Drainage Basin: Compromise Gulch

USGS Quadrangle map name(s): Neihart

Mine Type/Commodities: Hardrock/Silver, Gold, Lead, Zinc

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Private/Public
Owner, Agent, or Contact(Include address and phone when available): Peter Antonioli, Alexandra Resources Co., P.O. Box 791, Butte, MT 59702. (406) 723-8730; Lewis and Clark National Forest.

Relationship to other mines/sites in the area/district: Main adit is on the Moulton vein and extended to the Moulton claim.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? Adit #1 has a four-strand barbed wire fence.

General site features: Elevation 5750' , Slope 10°-25° , Aspect West

Land use: Mining X , Recreational X , Residential X , Urban___, Agricultural___, Other(Specify)

Area of disturbed/unvegetated lands? 5.7 acres.
Dimensions: 225 feet x 1,100 feet

Predominant vegetation types: Lodgepole pine, Quaking aspen, alder, pine grass, lupine

Access: roads - good X ,poor___,4wd___,trail___.
Other logistical considerations (proximity to other sites). Good access to base of mine.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There is 1 well log within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies in the drainage of the intermittent Compromise Gulch, which flows southwest through the site. Compromise Gulch flows into perennial Belt Creek 1/4 mile below the mine.

Mining/milling history, ore type/tenor, host rock, gangue: The claim was located in 1884 by John Wilson and operated later by the Cascade Silver Mines and Mills Co. and the Broadwater Consolidated Mines Co. The main adit was driven on the Moulton vein to the Moulton claim boundary. Production records were included under the Moulton mine. In 1945, a 150 feet shaft was sunk by Spehn, Loberg and Taylor with a drift at the 120 feet level. This was the last recorded development. The Moulton vein is in Pre-beltian black mica schists and pink gneiss. The vein is in mainly crushed altered country rock containing disseminated sulfides.

Mine Operation?
Shafts - Yes X, No ___, # 2, Comment Water in Shaft #1
Adits - Yes X, No ___, # 3, Comment Discharge in Adits #1 & #2
Pits - Yes ___, No X, # ___, Comment ___
Placers - Yes ___, No X, # ___, Comment ___
Other - Yes ___, No X, # ___, Comment ___

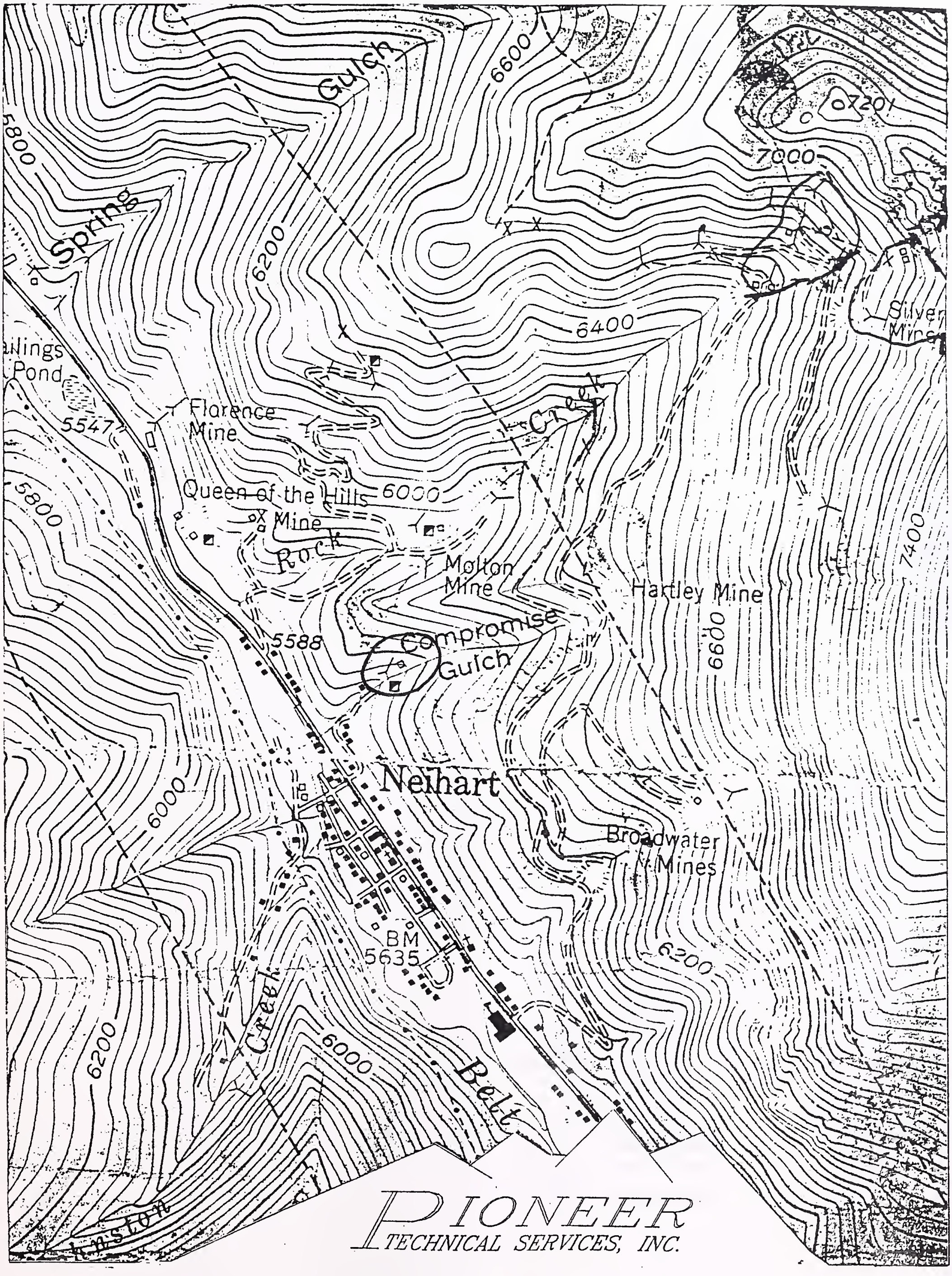
Mill Operation? Yes ___, No X. If yes answer the next three questions:

Period(s) of Operation: N/A

Origin of Ore Milled - Custom Mill ___ Dedicated Mill ___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
N/A

Well No.	Location	Depth	Yield	Static Water Level
M.25649	14N 08E 32 BDC	120.0	8.0	7.00

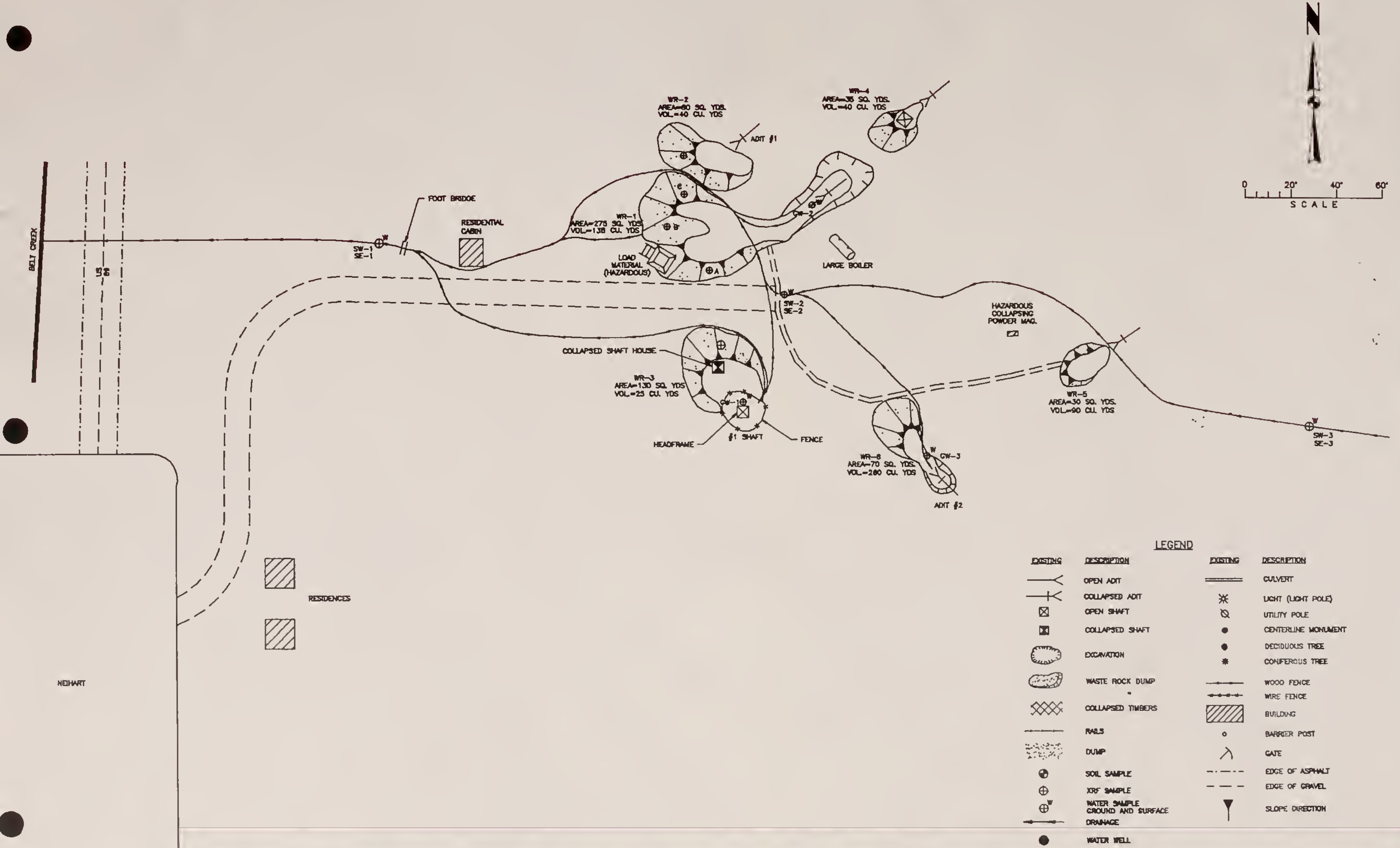


PIONEER
TECHNICAL SERVICES, INC.

COMPROMISE, P.A. NO. 07-100

T14N, R08E, SECTION 32

SCALE: 1' = 1000'



DRAWN MWC DATE 8/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

PIONEER TECHNICAL SERVICES INC. BUTTE, MT.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

COMPROMISE PA# 07-100
NEIHART DISTRICT CASCADE COUNTY

SHEET NO.

07-100.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Bullock, Flammang, Clark

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/TIME	ANALYSES
WR-1A	WR	136	Dump from Adit #1; east side	None	5.0 (D)	0.04	07-100-WR-1	06/01/93 1715	T-Metals, ABA
WR-1B	WR		Dump from above loadout; south side	None	< 3.5 (D)	0.04			
WR-1C	WR		Dump from above loadout; west side	None	4.5 (D)	0.05			
WR-2A	WR	40	Dump from small unnamed, collapsed adit; north part	None	5.0 (D)	0.04			
WR-2B	WR		Dump from small unnamed, collapsed adit; south side	None	5.0 (D)	0.04			
WR-3A	WR	25	Dump from Shaft #1; south end	None	5.8 (D)	0.05			
WR-3B	WR		Dump from Shaft #1; north side	None	6.0 (D)	0.04			
WR-4A	WR	40	Dump from Shaft #2; northeast side	None	5.1 (D)	0.05	07-100-WR-4	06/01/93 1645	T-Metals, ABA
WR-4B	WR		Dump from Shaft #2; southeast side	None	5.6 (D)	0.05			
WR-4C	WR		Dump from Shaft #2; southwest side	None	5.2 (D)	0.04			
WR-5A	WR	90	Dump from Adit #3; south side	None	4.8 (D)	0.04			
WR-5B	WR		Dump from Adit #3; west side in center	None	5.4 (D)	0.04			
WR-5C	WR		Dump from Adit #3; north side	None	5.4 (D)	0.04			
WR-6A	WR	260	Dump from Adit #2; southwest side	None	5.0 (D)	0.05			
WR-6B	WR		Dump from Adit #2; northwest side	None	5.7 (D)	0.04			
WR-6C	WR		Dump from Adit #2; east side	None	3.9 (D)	0.04			
SS-1	BKGRND	N/A	Background soil approx. 200 feet N30E from Adit #3	N/A	NM	0.03	07-100-SS-1	06/01/93 1700	T-Metals

* D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 07-100-WR-1 is composite of WR-1A through -1C, WR-2A and -2B, and WR-3A and -3B. 07-100-WR-3 is composite of WR-4A through -4C, WR-5A through -5C, and WR-6A through -6C.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes X , No___, Number: 2 Identification: Adit #1 and Adit #2

Filled shafts: Yes X , No___, Number: 1 Identification: Shaft #1

Seeps/Springs: Yes___, No X , Number:____ Identification:

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 6

Distance to nearest well used for drinking? Approx. 150 feet, slightly upgradient

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable X , Possible____, Unlikely____.
Field parameters indicates impacted water from adit and shaft discharges.

Other observations/notes: Field parameters indicate near neutral pH in Shaft #1 and discharging from adits with moderate SC - heavy iron staining - suspect high levels of zinc.

GROUNDWATER INVENTORY FORM

SAMPLERS: Bullock, Flammang

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm at 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
GW-1	SH	Shaft #1 - Bailer grab from 10' below SWL	25 gpm (E)	6.05	1060	284	6.7	49	N/A	07-100-GW-1	06/01/93 1500	Dissolved Metals, SO4, TDS, Hardness, Cl
GW-2	AD	Collapsed Adit #1 - Seep	5 gpm (E)	6.32	190	-020	5.6	68	N/A	07-100-GW-2	06/01/93 1215	T-Metals, SO4, TDS, Hardness, Cl
GW-3	AD	Collapsed Adit #2 - Seep	1.8 gpm (M)	5.91	130	-012	3.9	46	N/A	07-100-GW-3	06/01/93 1245	T-Metals, SO4, TDS, Hardness, Cl

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______________________

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X , No ___, Name(s): Compromise Gulch intermittant stream in drainage currently flowing - receives mine water and flows from that point year round.

Dry streambeds: Yes ___, No X , Name(s): ___

Other surface water: Yes ___, No X , Name(s)/Description: ___

Waste materials within any floodplain: Yes X , No ___ Source ID(s): WR-1, -5, and -6

Approximate Flood frequency? X 1 yr, ___10 yr, ___100 yr

Estimated seasonal flow of stream(s) (cfs)? 0.1 during investigation
High Flow: 1.0 cfs , Average Flow: 0.1 cfs

Distance between waste source(s) and nearest surface water body (ft)? 0 feet

Surface water draining onto or through waste sources: Yes X , No ___,
Describe: Stream runs around WR-5, discharge from Adit #2 flows over dump into stream; Discharge from Shaft #1 flows over WR-1 into the stream, discharge from Adit #1 joins discharge from Shaft #1.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Stock watering, fishery

Observed erosional/sedimentation/stream turbidity problems? Yes X , No ___, Distance downstream (ft)? 300 Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): Iron-staining to confluence with Belt Creek; cementing of bottom sediments, black precipitate (possibly magnesium and/or zinc).

SURFACE WATER INVENTORY FORM

SAMPLERS: Bullock

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	Below small foot bridge at bend in road to cabin; approx. 200 feet south of cabin	6.83	565	+034	8.9	17	45 gpm (M)	07-100-SW-1	06/01/93 1115	T-Metals, TDS, Hardness, SO4, NO2/NO3, Cl-
SE-1	SE	Below small foot bridge at bend in road to cabin; approx. 200 feet south of cabin	N/A	N/A	N/A	N/A	N/A	N/A	07-100-SE-1	06/01/93 1115	T-Metals
SW-2	SW	Below confluence of Adit #2 with Compromise Gulch stream	6.96	140	-035	7.2	38	13.2 gpm (M)	07-100-SW-2	06/01/93 1310	T-Metals, TDS, Hardness, SO4, NO2/NO3, Cl-
SE-2	SE	Below confluence of Adit #2 with Compromise Gulch stream	N/A	N/A	N/A	N/A	N/A	N/A	07-100-SE-2	06/01/93 1310	T-Metals
SW-3	SW	Upgradient approx. 200 feet above WR-5	7.44	130	310	6.7	37	12 gpm (M)	07-100-SW-3	06/01/93 1400	T-Metals, TDS, Hardness, SO4, NO2/NO3, Cl-
SE-3	SE	Upgradient approx. 200 feet above WR-5	N/A	N/A	N/A	N/A	N/A	N/A	07-100-SE-3	06/01/93 1400	T-Metals

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 0.5 acre on-site

Wetlands present: Yes___, No X , Describe: With exception of very small impacted ponding area on top of WR-1

Carbonate rocks/soils: Yes___, No X , Describe:

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X ; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 25' (recreational); approx. 200 yds to the full-time residences.

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock, Flammang, Clark

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH /MODERATE/LOW/NONE)
WR-1	pH; FEOX	Partial	2,475	2,100	No	None
WR-2	pH; FEOX	Dry	720	880	No	None
WR-3	pH; FEOX	Partial	1,170	880	No	None
WR-4	pH; FEOX	Dry	315	250	No	None
WR-5	pH; FEOX	Partial	270	880	No	None
WR-6	pH; FEOX	Partial	630	630	No	None

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes_X_, No____,
Describe: Most appear to be part-time cabins

Population within 1 mile: 1-10___; 10-30___; 30-100_X_; 100-300___;
300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments____

Evidence of recreational use on site: Yes_X_, No___, Describe:
Cabin use

Accessibility - Fences, warning signs, closed roads? Fence around Shaft #1 only

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment____
Wilderness Area - Yes___, No_X_, Comment____
T&E Species Habitat - Yes___, No_X_, Comment____
Bat Habitat - Yes___, No_X_, Comment____

Primary Drainage_X_; Secondary Drainage___; No Information___:

Riparian Habitat Quality - High_X_, Medium___, Low___
Wetlands Frontage - High___, Medium_X_, Low___
Fisheries Habitat and Species Classification - _3_
Sport Fishery Classification - _3_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_1_, types and locations:
Shaft #1 (fenced), rest have collapsed

Hazardous structures: Yes_X_, No___, Number____, types and locations:
Headframe - Shaft #1

Unstable highwalls, pits, trenches, slopes: Yes_X_, No___, Number_2_,
types and locations: At Adit #1 and Shaft #2, currently sluffing; Adit #1 is approx. 30' high; highwall at Shaft #2 is approx. 15' high.

Unstable waste piles, impoundments, undercut banks: Yes_X_, No____,
Number_1_, types and locations: WR-1 has been eroded by stream.

Fire and/or Explosion hazards: Yes___, No_X_, Explain:____

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

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MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Compromise, Prepared by Chen-Northern, September 9, 1989.

USBM, Mines and Mineral Deposits (Except Fuels), Cascade County, Montana, Information Circular No. 7589, Written by Almon F. Robertson, April 1950.

USGS, Topographic Map, Neihart, Montana, 7 1/2 minute Quadrangle, 1961.

LABORATORY ANALYTICAL DATA

COMPROMISE
PA NO. 07-100

MDSL AMRB/PIONEER 4/9/93

Compromise PA# 07-100
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BULLOCK
INVESTIGATION DATE: 06/01/93

SOLID MATRIX ANALYSES

Metals in soils   Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
07-100-SE-1	56.2	690	22.5	163	11.1	35.6	30100	0.064 U	86100	604	772	4.18 UJ	5600	NR
07-100-SE-2	78.7	1250	10.7	9.61	11.5	38.6	24600	0.147	8700	66.8	3690	3.19 UJ	2470	NR
07-100-SE-3	6.93	146	0.7	8.98	10.4	9.04	23600	0.059 U	854	15.6	31.7	2.74 UJ	189	NR
07-100-WR-1	164	323	19.4	16.5	8.64	90.7	43600	0.516	14500	89.8	6680	3.59 UJ	3810	NR
07-100-WR-4	177	311	29.9	20.7	9.29	65.4	43500	0.245	8560	63.5	3160	3.38 UJ	7520	NR
BACKGROUND	53.3	828	15.3	11.6	72.7	50.1	30600	0.051 U	10400	91.5	5110	2.99 UJ	3530	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
07-100-WR1	1.12	35	41.4	6.38	0.21	0.48	0.43	15	26.4

WATER MATRIX ANALYSES

Metals in Water   Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
07-100-GW-1	7.61	7.73	10.2 J	80.7	12.6	25.1	16600 J	0.200	45200 JX	447	34 J	18.3 U	8780	490
07-100-GW-2	3.72	74.3	2.55 U	5.99 U	5 U	10.6	1380 J	0.210	140 JX	47.8	11.2 J	18.3 U	164	81.1
07-100-GW-3	3.48	22.2	2.55 U	5.99 U	5 U	5.77	199 J	0.100	60.4 JX	8.78 U	4.21 J	18.3 U	165	50.5
07-100-SW-1	6.17	11	2.55 U	10.9	5 U	15	12500 J	0.160	7450 JX	106	123 J	18.3 U	3660	262
07-100-SW-2	2.98	43.2	2.55 U	5.99 U	5 U	13.1	152 J	0.170	71.8 JX	8.78 U	9.77 J	18.3 U	454	57.7
07-100-SW-3	4.53	171	2.55 U	5.99 U	5 U	14.1	760 J	0.230	358 JX	9.57	126 J	18.3 U	310	56.7

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Wet Chemistry   Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
07-100-GW-1	845	< 5.0	506	0.08	NR
07-100-GW-2	124	< 5.0	26	< 0.05	NR
07-100-GW-3	79	< 5.0	15	0.05	NR
07-100-SW-1	394	< 5.0	246	< 0.05	NR
07-100-SW-2	80	< 5.0	22	< 0.05	NR
07-100-SW-3	74	< 5.0	21	< 0.05	NR

LEGEND

SE1 - Below small footbridge in bend in road to cabin, approx. 200' South of cabin.
SE2 - Below confluence of adit #2 with Comprommise Gulch stream.
SE3 - Upgradient, approx. 200' above waste rock dump 5.
WR1 - Composite of subsamples WR1A, IB, and 1C.
WR4 - Composite of subsamples WR4A, 4B, 4C, 5A, 5B, 5c, 6A, 6B, and 6C.
BACKGROUND - 200' Northeast from adit #3; from the Compromise Mine (07-100-SS-1).

GW1 - From shaft #1- bailer grab from 10' below SW1.
GW2 - Collapsed adit #1 - seep.
GW3 - Collapsed adit #2 - seep.
SW1 - Same as sample SE1.
SW2 - Same as sample SE2.
SW3 - Same as sample SE3.

XRF ANALYSIS RESULTS

COMPROMISE
PA NO. 07-100

MDSL AMRB/PIONEER 4/9/93

Mine Name: Compromise PA# 07-100
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
07-100-SE-1		3371.08	2093.78	348.549	157.562 *	98892.9	24651.6			6740.77		106.554
07-100-SE-2		3313.47	1975.48	424.932	204.872 *	109747	18675.9			3743.15		241.948
07-100-WR1-A		26926.1	4208.14	2817.68		20688.2	50266		357.68 *	10163.1		125.636
07-100-WR1-B		35275.9	6757.71	3709.5		33080.3	59012.9			4032.56		132.238
07-100-WR1-C		22394.6	4913.27	2469.35		8667.55	59188.7			1871.39		224.748
07-100-WR2-A		27590.5	6534.2	3852.29		16209.8	46520.1		77.0924 *	1507.81		86.5349
07-100-WR2-B		28736.3	6372.01	3600.19		17668	53644.8		95.0273 *	1249.95		77.567
07-100-WR3-A		33163.7	7099	4350.85		17429.2	54774.6			1188.36	130.1 *	60.6864
07-100-WR3-B		38066.7	5605.66	4180.28		23368.3	55926.4			1902.37		50.2292
07-100-WR4-A		28342.6	4535.51	3561.33		19701.9	46944.9			1989.35		75.3005
07-100-WR4-B		23795.5	5938.73	4086.18		2557.59	37009.4		101.552 *	1265.89		226.37
07-100-WR4-C		35033.3	3566.98	2332.92		40270.6	85725		247.088 *	6147.14		295.846
07-100-WR5-A		39377.8	5621.67	2555.06		10240.5	43836.5			11260.8	196.503 *	61.9935
07-100-WR5-B		33038.3	4070.73	2959.38	125.166 *	3802.19	37571.2			1996.38	59.1344 *	215.025
07-100-WR5-C		43892.8	3056.08	3523.41		5942.55	49447.7		100.974 *	6943.2		53.3154
07-100-WR6-A		20862.2	4459.48	4481.06		6109.28	38496.6			1508.45		118.177
07-100-WR6-B		30113.8	6652.16	6467.41		7835.99	52003.2			4079.17		115.758
07-100-WR6-C		33304.2	2683.93	3152.61		6619.46	48115.2			1892.97		133.924
07-100-WR-1-COMP		33187	5662.82	3789.93		21964.3	55773.7			2959.61		102.503
07-100-WR-3-COMP		30728	4856.28	4368.79		7732.86	45059.5			4535.41		119.647

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
07-100-SE-1	57.6034			663.269	37.8117 *			1020.58	89.1292 *		
07-100-SE-2	95.5679			454.7	44.0787 *			703.09	105.918 *		
07-100-WR1-A	129.713			9421.27	142.288	200.488 *	48.0765 *	2784.12	177.508 *		30.401 *
07-100-WR1-B	171.127			2964.45	184.884	128.563 *		6934.73	79.9919 *		
07-100-WR1-C	186.164			2086.18	134.951			1521.91	127.689 *		
07-100-WR2-A	126.425			2677.97	206.059			1296.35	84.7786 *		
07-100-WR2-B	115.476			2405.73	159.992	123.915 *		767.758	124.844 *		
07-100-WR3-A	163.44	56.945 *		1250.3	207.826	191.863 *		392.949	151.915 *		
07-100-WR3-B	170.267			1718.54	228.557	142.059 *		296.193	191.138 *		
07-100-WR4-A	109.805			3158.51	213.929			453.75	178.505 *		
07-100-WR4-B	223.256			928.777	140.99			1757.13	103.188 *		12.0342 *
07-100-WR4-C	145.748			11669.9	194.389	200.397 *	113.105 *	15044.9	187.474 *		
07-100-WR5-A	386.011			2629.98	182.581	219.625 *		279.204	179.206 *	15.8179 *	14.9919 *
07-100-WR5-B	290.519			196.333	119.328			2121.9	78.8917 *		
07-100-WR5-C	209.14			2686.55	210.434	256.609 *		541.732	137.181 *		
07-100-WR6-A	97.9586			616.438	118.166			962.957	97.1436 *		
07-100-WR6-B	115.094			1406.93	173.462			796.665	87.9788 *		
07-100-WR6-C	120.862			3718.95	180.578			5539.77	190.099 *		
07-100-WR-1-COMP	158.699			3900.76	191.698			1001.65	131.899 *		
07-100-WR-3-COMP	221.086			2022.33	169.997			1350.34	124.112 *		

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

COMPROMISE
PA NO. 07-100

AIMSS SCORESHEET

SITE NAME: COMPROMISE
PA NUMBER: 07-100

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.554
6	GW - TARGETS	WELLS - 1 MI. x 2.5		2.5
7		WELLS - 1 TO 4 MI		5
8		NEAREST WELL		10
9		TARGETS SCORE	LINES 6 + 7 + 8	17.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	3878
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		300
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	700
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.578
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		5
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 - 22	22
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	8901
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		1
26B		DISTANCE TO POPULATION		20
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	20
27		LIKELIHOOD SCORE	LINES 25 + 26C	20
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.020
29	AIR - TARGETS	POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		10
31		WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 - 33	50
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	20
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		250
37A		ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		20
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	400
38		LIKELIHOOD SCORE	LINES 36 + 37C	650
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.018
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		30
41		NEAREST RESIDENCE		10
42		RECREATIONAL USE		5
43		TARGETS SCORE	SUM LINES 40 - 42	45
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	527
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**0.13**

				SITE NAME: COMPROMISE
LINE NO.		**SITE SAFETY**		PA NUMBER: 07-100
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	100
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	150
5		HAZ. STRUCTURES	40 EA.	40
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 - 7	290
9		POPULATION - 1 MILE		30
10	TARGETS	NEAREST RESIDENCE		10
11		RECREATIONAL USE		5
12		TARGETS SCORE	SUM LINES 9 - 11	45
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**261.00**

SUMMARY OF HISTORICAL ANALYTICAL DATA
FROM OTHER SOURCES

REPORT DATE: October 4, 1990

CLIENT: Abandon Mines

FIELD ID: Compromise Shaft

LAB NO: W8560

DATE RECEIVED: 09-14-90

Hardness 426 mg/L as $CaCO_3$

Total Extractable Metals

As 0.005 mg/L

Cd 0.0050 mg/L

Cu <0.01 mg/L

Fe 17.5 mg/L

Pb 0.292 mg/L

Zn 10.4 mg/L

DATE: October 29, 1990

CLIENT: Abandoned Mines

FIELD ID: Compromise Mine Waste Dump--08/15/90

LAB NO: S2695

DATE RECEIVED: 09-24-90

pH (1:1 slurry) 7.97 SU

Total Metals

As	228	mg/Kg
Cd	72	mg/Kg
Cu	34	mg/Kg
Fe	54,500	mg/Kg
Pb	4140	mg/Kg
Zn	12,800	mg/Kg

SITE NAME: COMPROMISE MINE
DATE: 15-Aug-90

STATION	FLOW (gpm)	pH (s.u.)	SPECIFIC CONDUCTANCE (umhos/cm)	TEMP. (celcius)	COMMENTS
SHAFT	2	5.01	550	7.1	SAMPLE COLLECTED
ADIT	1	6.14	139	8.7	
WEST SEEP (BLW DUMP)	3-5	6.20	249	10.5	
EAST SEEP (BLW DUMP)	5	6.11	205	9.6	
STREAM	9	6.30	308	10	COMBINATION OF THE TWO SEEPS
PIPE (SPRING)	2.5	5.17	530	9.6	APPEARS TO BE A DRINKING WATER SOURCE FOR THE RESIDENCE
SEEP (ACCESS RD)		6.02	610	8.0	

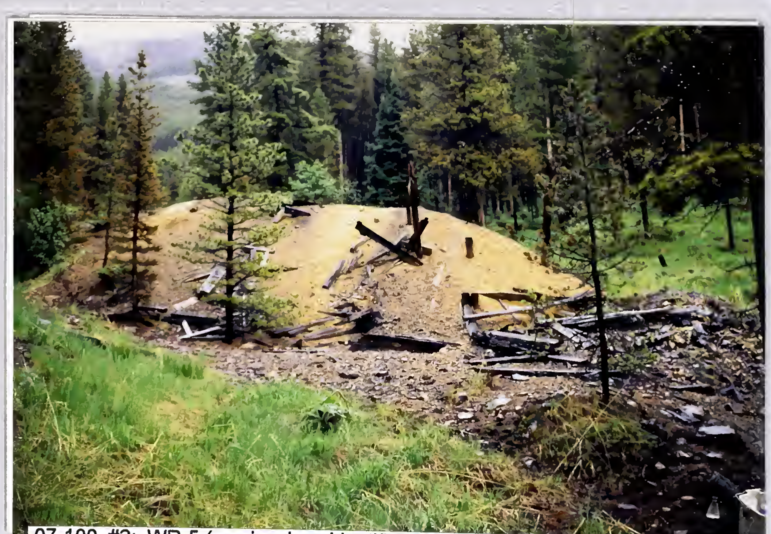
SITE NAME: DACOTAH MINE
DATE: 15-Aug-90

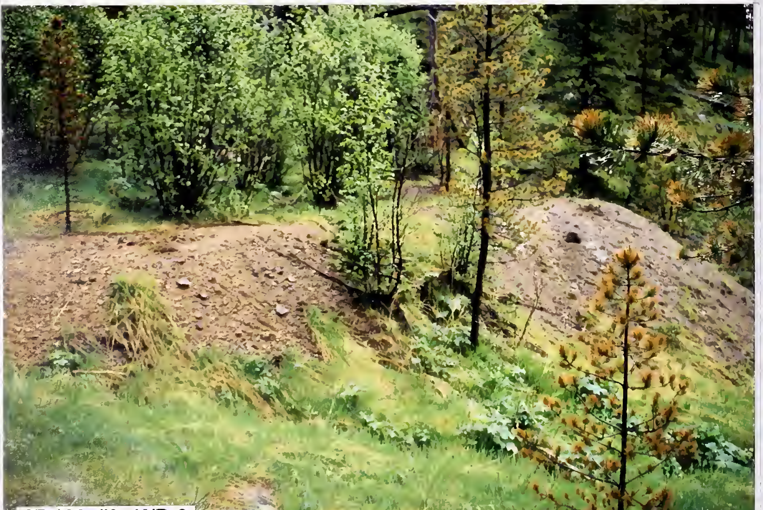
STATION	FLOW (gpm)	pH (s.u.)	SPECIFIC CONDUCTANCE (umhos/cm)	TEMP. (celcius)	COMMENTS
SHAFT #1	15	2.97	1700	7.7	SAMPLE COLLECTED, ALKALINITY = 0 MG/L AS CACO
ADIT #4	<1	6.72	111	9.7	
STREAM (ADJ TO #4)	50-75	6.62	90	11.2	

SITE NAME: ROCHESTER PATENT
DATE: 15-Aug-90

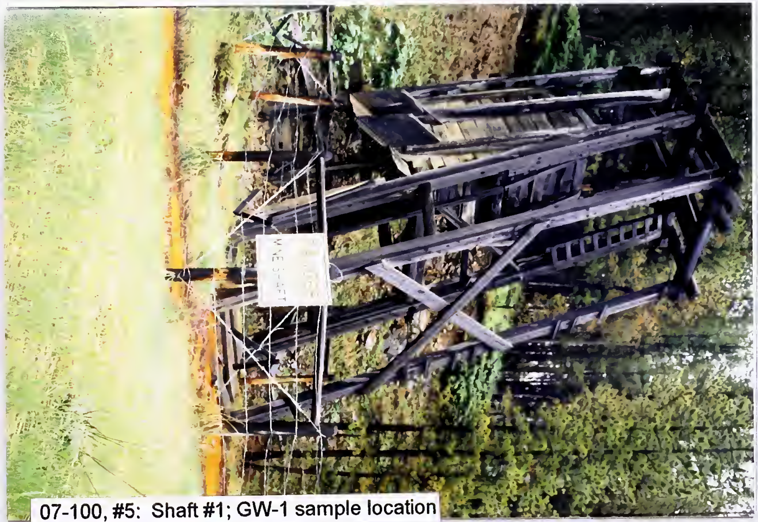
STATION	FLOW (gpm)	pH (s.u.)	SPECIFIC CONDUCTANCE (umhos/cm)	TEMP. (celcius)	COMMENTS
STREAM (DOWNGRADIENT)	30	4.55	780	16.1	STREAM RECIEVES DACOTAH #1 DRAINAGE 1/4 MILE SAMPLE COLLECTED AT THIS LOCATION
STREAM	30	4.53	820	15.4	

07-100, #1: SW-3 sample location

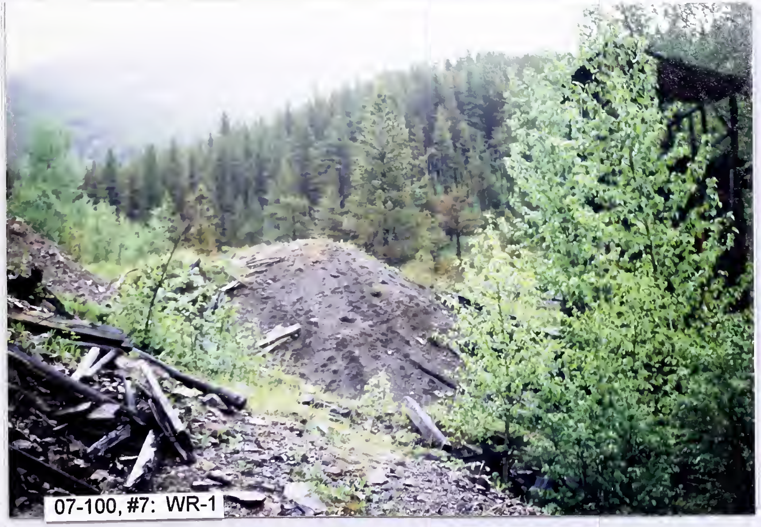

07-100, #2: WR-5 (previously unidentified adit and dump)


07-100, #3: WR-6

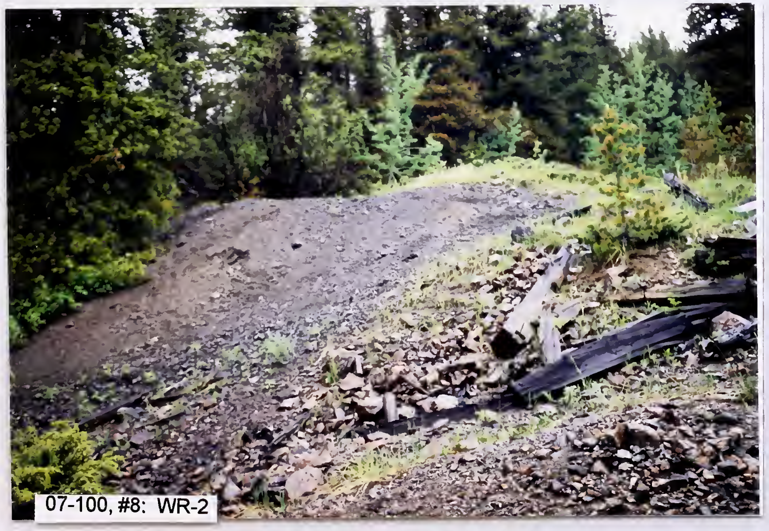
07-100, #4: Adit #2; GW-3 sample location



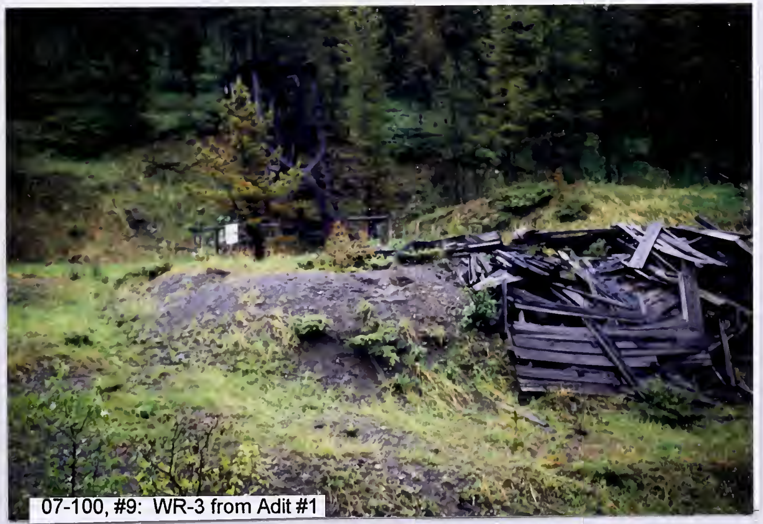
07-100, #5: Shaft #1; GW-1 sample location



07-100, #7: WR-1



07-100, #8: WR-2



07-100, #9: WR-3 from Adit #1

07-100, #10: Adit #1; GW-2 sample location

07-100, #11: Cabin and drainage

07-100, #12: SW-1 sample location

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: CARPENTER CREEK TAILINGS **PA#:** 07-103

Date: May 24 and 25, 1993 **Time:** 1245 / 0715

Field Team Leader: Tuesday, Pioneer

Sampling Personnel: Babits, Clark, Belanger,
Flammang, Lasher; Pioneer
Pierson, TD&H

Visitors: None

Weather/Seasonality Observations: Partly cloudy; slight breeze; 65°F; Carpenter Creek is running fairly full with lots of run-off crossing tailings; cool, wet spring weather.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number)**:** #1-#3: NE on lower Carp. Crk. Tails facing SW (Panorama); #4: Where surface water enters tails (E); #5: Surface water running across tails (S); #6: Surface water flowing across tails (NW); #7: Tributary creek entering Carp. Crk. (NW); #8: Same as #7 (W); #9: W end of tails-Tails dam-South; #10: Same as #9 and tails sluffing (SE); #11: Surface water drainage, (NE); #12: Carp. Crk. Tails washout (N); #13: Upper Tails (W end) dam (S); #14: Tributary creek entering Carp. Crk. overview (NE); #15: Tributary creek entering Carp. Crk.-Upper Tails (W end) (N); #16: Water drainage onto Upper Tails NE section of tails (SE); #17,18: Panorama shot of Upper Tails (SW) sitting on W end of tails; #19: Tributary creek on NE corner of Upper Tails (SE); #20: Same as #19 (NW); #21: Tributary creek entering Carp. Crk. and center of Upper Tails (NW); #22,23: Lower tails, panorama from road to East; #24-26: Upper Tails., panorama from road looking East-South. Video Tape No. 1

General Comments/Observations (not covered specifically in attached Inventory Forms)**:** Present on the East side of Carp. Crk. approx. 6' bgs. is a 1' layer of black stained particles. Materials (sand & cobbles) appear to be coated with black substance. No hydrocarbon smell present at or near 07-103-SW-5 sampling site, SE-2 (XRF sample) site and 07-103-SW-1 site.

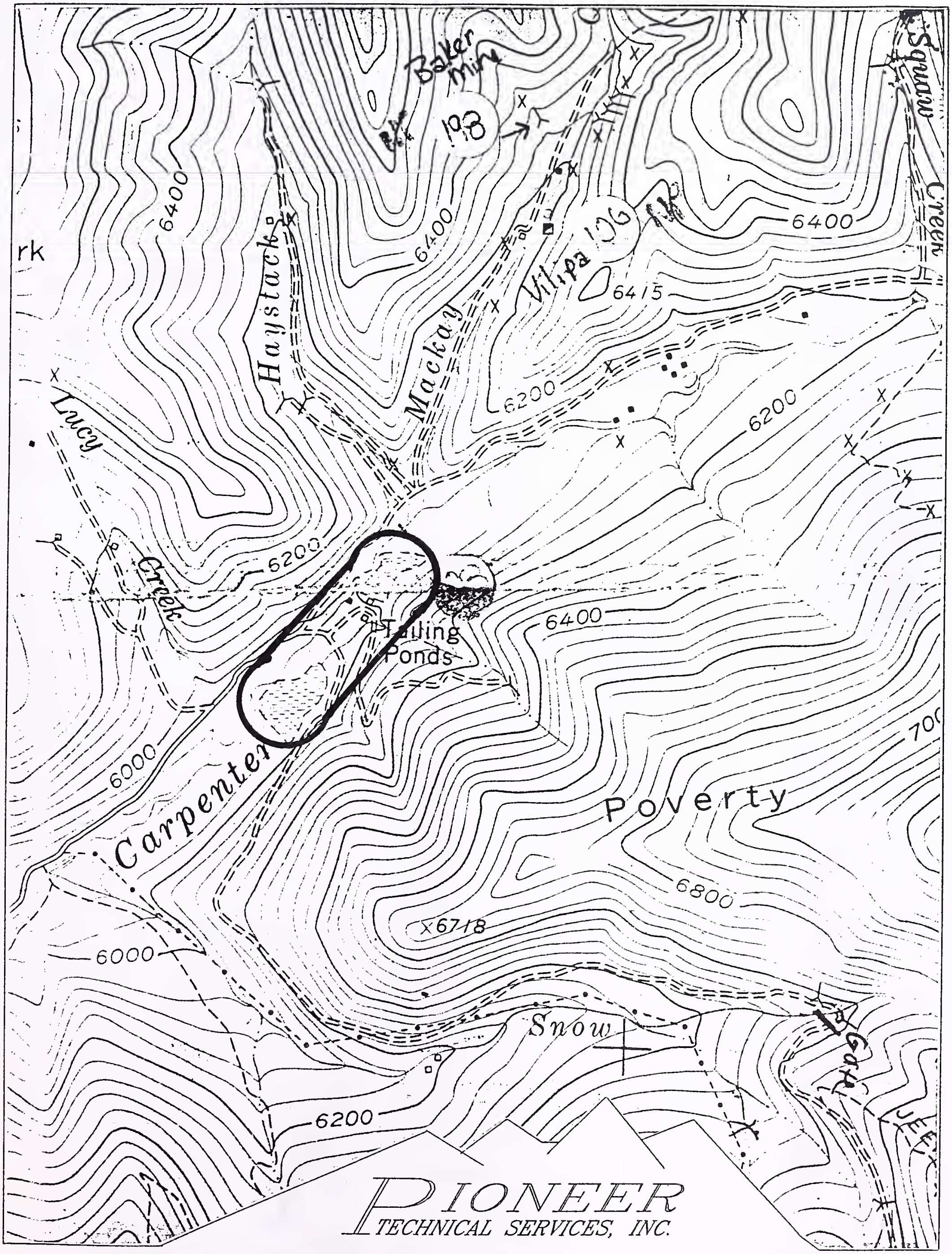
Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Route surface water around or over tailings; pull back tailings from Carpenter Creek.

Montana Bureau of Mines and Geology
Water Well Log Data

10/22/1993

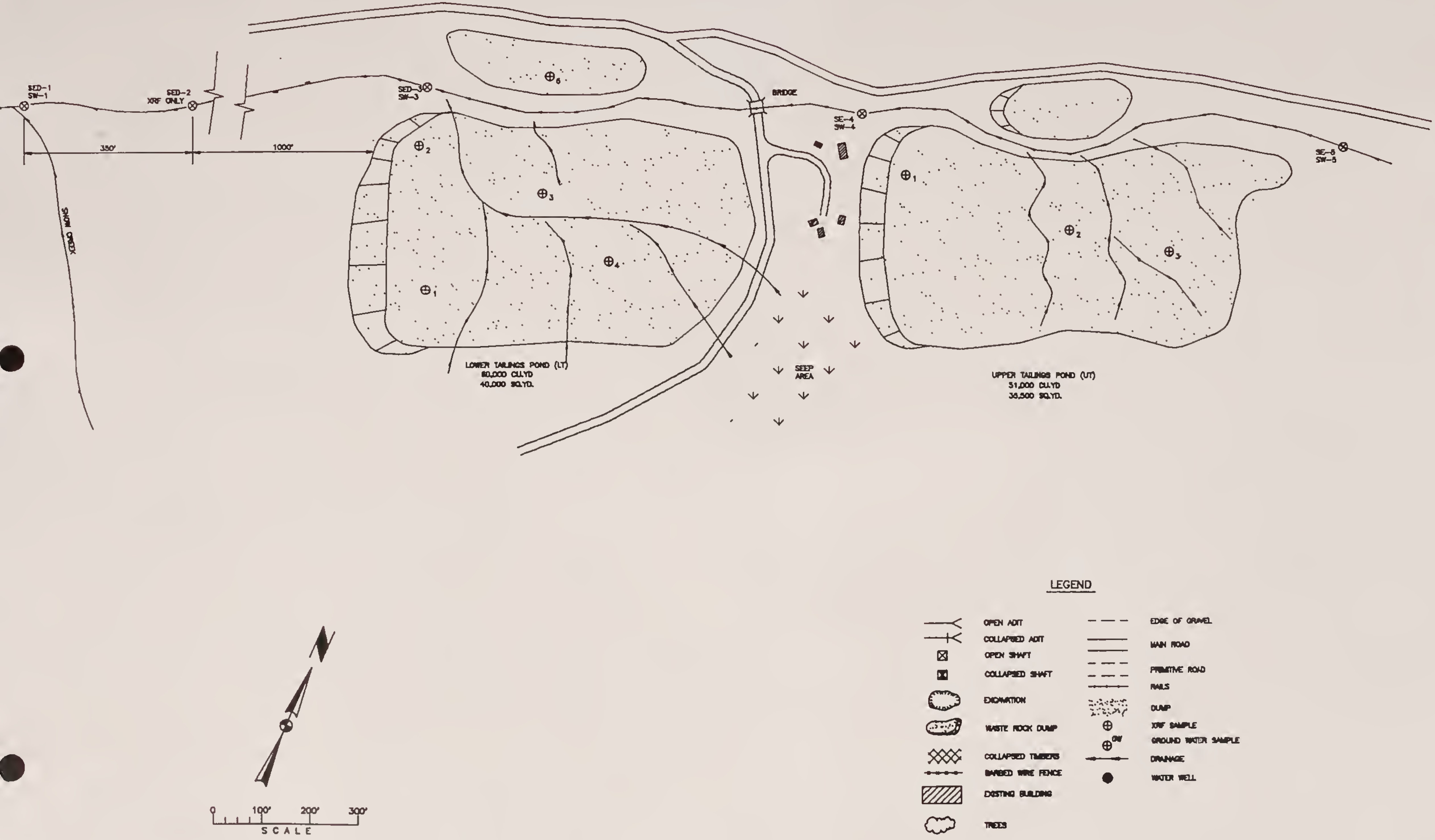
Well No.	Location	Depth	Yield	Static Water Level
M:123062	14N 08E 20 DBA	41.0	4.0	24.00
M:123061	14N 08E 20 DBA	40.0	7.0	0.00



CARPENTER CREEK TAILINGS, P.A. NO. 07-103

T14N, R08E, SECTIONS 16, 21

SCALE: 1" = 1000'



DRAWN JTP
DESIGNED TPR
APPROVED
DATE 3 JUNE 93
JOB NO. 93-17
F.B. NO.

PIONEER TECHNICAL SERVICES, INC. BUTTE, MT.

TD&H

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

CARPENTER CREEK TAILINGS PA# 07-103
NEIHART DISTRICT CASCADE COUNTY

SHEET NO.

SHEETS

07-103.DWG

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): CARPENTER CREEK TAILINGS PA#: 07-103

Legal Description: T 14N ;R 8E ;Sec. 16 , SE1/4SW 1/4 ___1/4
Sec. 21 , NE1/4NW 1/4 ___1/4

County: CASCADE Mining District: NEIHART

Latitude: N 46° 58' 00" Longitude: W 110° 43' 01"

Primary Drainage Basin and Code: Belt Creek/10030105
Secondary Drainage Basin: Carpenter Creek

USGS Quadrangle map name(s): Neihart

Mine Type/Commodities: Mill Tailings
Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Private/Public
Owner, Agent, or Contact(Include address and phone when available): Amax Exploration; Lewis and Clark National Forest, P.O. Box 871, Great Falls, MT 59403.

Relationship to other mines/sites in the area/district: Down stream from several mines including Silver Dyke Mill. Tailings at Carp. Crk. are thought to originate from the Silver Dyke Mill.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? AMRB reclamation planning.

General site features: Elevation 5900' ,Slope Very gentle ,
Aspect Southwest

Land use: Mining___, Recreational X , Residential___, Urban___,
Agricultural___, Other(Specify)___

Area of disturbed/unvegetated lands? 15.6 acres.
Dimensions: Lower pond, 360,000 ft^2; upper pond, 320,000 ft^2.

Predominant vegetation types: On tails.: none to some snake grass colonizing surrounding area; Lodgepole pine on slopes; willows in stream floodplain.

Access: roads - good X ,poor___,4wd___,trail___.
Other logistical considerations (proximity to other sites). Big Seven mine further up Snow Creek Road; Silver Dyke Complex further up (1.5 miles) Carp. Crk. Road; Baker, Vilipa, and Sherman #2 all within 1 mile of site.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 2 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Carp. Crk. Tails. lies on the alluvium in the floodplain of Carp. Crk. Ore occurs as veins in gneisses or schists or at contact with later intrusives. Veins have high silver content; deeper levels contain large quantities of lead and zinc.

Mining/milling history, ore type/tenor, host rock, gangue: Carp. Crk. tailings ponds probably functioned as tailings ponds for the Silver Dyke Mine and Millsite upstream. Remnants of an apparent flume are visible in upper tailings. Mining at Silver Dyke began in 1923 through 1929. Tailings ponds were present in 1935.

Mine Operation?

Shafts -	Yes___,	No X,	# ____,	Comment
Adits -	Yes___,	No X,	# ____,	Comment
Pits -	Yes___,	No X,	# ____,	Comment
Placers -	Yes___,	No X,	# ____,	Comment
Other -	Yes X,	No____,	# 2,	Comment Tailings ponds

Mill Operation? Yes____, No X. If yes answer the next three questions: (Impoundment only)

Period(s) of Operation: Received tailings 1921-1929

Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: Silver Dyke Mill

Process? Hg-amalgam, CN$^-$ leach (vat, heap), floatation, smelting?
Floatation

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): Interbedded from med. sand to clay size; 50% sand, 30% silt, 20% clay.

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): Bottom not reached; over 15' deep at toe, > 9' in center. Reduced zone observed-gray color correlates with saturated zone; approx. 0.5-1' in saturated tails.

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): Mostly wet at this time of year during the investigation; runoff flowing over tailings.

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): Poor to nonexistent; wood/pole dam with no side containment.

Comments on potential for mitigation: Simple runon/runoff control and isolation from Carp. Crk. would go a long way toward reducing problems; unstable toe should be reinforced; tails could be covered since they blow when dry.

SOURCE INVENTORY FORM

SAMPLERS: Tuesday, Lasher, Clark, Belanger

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (Mr/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
LT-1A	TAIL	60,000	Site 1 lower pond; borehole, 0′-3′	Poor	5.2 (D)	0.05	07-103-LT-1	05/24/93 1830	T-Metals, CN, ABA
LT-1B	TAIL		Site 1 lower pond; borehole, 3′-6′	Poor	4.6 (D)	0.03	N/A	N/A	XRF Analysis
LT-1C	TAIL		Site 1 lower pond; borehole, 6′-9′	Poor	3.7 (D)	0.04	N/A	N/A	XRF Analysis
LT-1D	TAIL		Site 4 lower pond; borehole, 9′-12′	Poor	4.0 (D)	0.04	07-103-LT-2	05/24/93 1830	T-Metals, CN, ABA
LT-2A	TAIL		Site 2 lower pond; borehole, 0′-3′	Poor	5.0 (D)	0.05			
LT-2B	TAIL		Site 2 lower pond; borehole, 3′-6′	Poor	5.6 (D)	0.04	N/A	N/A	XRF Analysis
LT-2C	TAIL		Site 2 lower pond; borehole, 6′-9′	Poor	4.2 (D)	0.05	N/A	N/A	XRF Analysis
LT-2D	TAIL		Site 2 lower pond; borehole, 9′-12′	Poor	< 3.5 D	0.04			
LT-3A	TAIL		Site 3 lower pond; borehole, 0′-3′	Poor	4.8 (D)	0.05			
LT-3B	TAIL		Site 3 lower pond; borehole, 3′-6′	Poor	4.0 (D)	0.03	N/A	N/A	XRF Analysis
LT-3C	TAIL		Site 3 lower pond; borehole, 6′-9′	Poor	4.8 (D)	0.04			
LT-4A	TAIL		Site 4 lower pond; borehole, 0′-3′	Poor	4.8 (D)	0.05			
LT-4B	TAIL		Site 5 lower pond; borehole, 3′-6′	Poor	5.0 (D)	0.05			
LT-4C	TAIL		Site 4 lower pond; borehole, 6′-9′	Poor	NM	NM	N/A	N/A	XRF Analysis
LT-5A	TAIL		Site 5 lower pond	Poor	NM	NM	N/A	N/A	XRF Analysis

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 07-103-LT-1 is composite of LT-1A, -2A, -3A, and -4A.
07-103-LT-2 is composite of LT-1D, -2D, -3C, and -4B.
NM = Not Measured

SOURCE INVENTORY FORM (Cont'd)

SAMPLERS: Tuesday, Lasher, Clark, Belanger

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
UT-1A	TAIL	51,000	Site 1 upper pond; 0'-3', brown sand	Poor	6.0 (D)	NM	N/A	N/A	XRF Analysis
UT-1B	TAIL		Site 1 upper pond; 3'-6', brown sand	Poor	4.1 (D)	0.04	07-103-UT-1	05/25/93 1230	T-Metals, ABA, CN-
UT-1C	TAIL		Site 1 upper pond; 6'-9', brown sand	Poor	4.4 (D)	NM	N/A	N/A	XRF Analysis
UT-1D	TAIL		Site 1 upper pond; 9'-12', gray sand	Poor	4.2 (D)	0.04	07-103-UT-2	05/25/93 1230	T-Metals, ABA, CN-
UT-1E	TAIL		Site 1 upper pond; 12'-15', gray sand	Poor	5.0 (D)	NM	N/A	N/A	XRF Analysis
UT-2A	TAIL		Site 2 upper pond; 0'-3', brown sand	Poor	5.0 (D)	0.06			
UT-2B	TAIL		Site 2 upper pond; 3'-6', some gray sand	Poor	NM	0.04	N/A	N/A	XRF Analysis
UT-2C	TAIL		Site 2 upper pond; 6'-9', gray sandy clay	Poor	6.8 (D)	0.03			
UT-2D	TAIL		Site 2 upper pond; 9'-12', black	Poor	NM	0.04	N/A	N/A	XRF Analysis
UT-3A	TAIL		Site 3 upper pond; 0'-3', brown sand	Poor	5.0 (D)	0.03	N/A	N/A	XRF Analysis
UT-3B	TAIL		Site 3 upper pond; 3'-6'	Poor	5.8 (D)	0.04			
UT-3C	TAIL		Site 3 upper pond; 6'-9', gray sand	Poor	4.2 (D)	0.035			

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 07-103-UT-1 is composite of UT-1B, -2A, and -3B. 07-103-UT-2 is composite of UT-1D, -2C, and -3C.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No X , Number:____ Identification:______________

Filled shafts: Yes___, No X , Number:____ Identification:______________

Seeps/Springs: Yes X , No____, Number:_____ Identification: Seep is present in the northeastern corner of the lower tailings pond.

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 27

Distance to nearest well used for drinking? Residence located approx. one mile below the site; not directly downgradient.

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable X , Possible____, Unlikely____.
Groundwater present in tailings boreholes. Tailings contain elevated levels of heavy metals.

Other observations/notes: The nearest well is located on the opposite side of Carpenter Creek from the site and up slightly on hillside; approx. 1 mile downstream from site.

GROUNDWATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X , No ___, Name(s): Carpenter Creek; Unnamed tributaries crossing Carpenter Creek Tailings and emptying into the creek.

Dry streambeds: Yes ___, No X , Name(s): ___

Other surface water: Yes X , No ___, Name(s)/Description: One pond on south side of lower tailings pond, fairly small (25'x25'); water drains out of pond and onto lower tailings pond.

Waste materials within any floodplain: Yes X , No ___ Source ID(s): Carpenter Creek bisects both tailings ponds.

Approximate Flood frequency? X 1 yr, ___ 10 yr, ___ 100 yr

Estimated seasonal flow of stream(s) (cfs)? Spring flow is 60.2 cfs.
High Flow: 70 cfs , Average Flow: 5 to 10 cfs

Distance between waste source(s) and nearest surface water body (ft)? 0 feet; Carpenter Creek dissects upper and lower tailings ponds, surface water flows over ponds in channels.

Surface water draining onto or through waste sources: Yes X , No ___, Describe: Runoff flowing across tailings in well-defined channels; two of the larger channels may contain water all year.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?) Fishery (Belt Creek), wetlands, possible irrigation.

Observed erosional/sedimentation/stream turbidity problems? Yes X , No ___, Distance downstream (ft)? 1000' Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): Tailings are entrained in streambank on both sides to a depth of at least 6' bgs for at least 1/2 mile downstream. Release of tailings into Carpenter Creek observed during storm event.

SURFACE WATER INVENTORY FORM

SAMPLERS: Babits, Flammang

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm at 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow' cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	Above confluence of Snow Crk. in Carpenter Creek	7.97	90	N/A	6.5	14	37.5 cfs (M)	07-103-SW-1	05/24/93 1900	T-Metals, TDS, Hardness, NO2/NO3, SO4, Cl
SE-1	SE	Just above conf. with Snow Crk. approx. 730' from SE-2	N/A	N/A	N/A	N/A	N/A	N/A	07-103-SE-1	05/24/93 1535	T-Metals
SE-1A	SE	Just above conf. with Snow Crk. approx. 730' from SE-2	6.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	XRF Analysis
SE-2	SE	1000' from base of lower tailings pond	5.6	N/A	N/A	7.8	N/A	N/A	N/A	N/A	XRF Analysis
SW-3	SW	At PPE of lower tailings pond	6.4	70	N/A	7.8	17	NM	07-103-SW-3	05/24/93 1615	T-Metals, TDS, Hardness, NO2/NO3, SO4, Cl
SE-3	SE	At PPE of lower tailings pond	3.8	N/A	N/A	N/A	N/A	N/A	07-103-SE-3	05/24/93 1615	T-Metals
SW-4	SW	At PPE of upper tailings pond	8.13	70	N/A	7.9	16	NM	07-103-SW-4	05/24/93 1715	T-Metals, TDS, Hardness, NO2/NO3, SO4, Cl
SE-4	SE	At PPE of upper tailings pond	6.4	N/A	N/A	N/A	N/A	N/A	07-103-SE-4	05/24/93 1715	T-Metals
SW-5	SW	Upgradient of upper tailings	8.7	20	N/A	N/A	16	NM	07-103-SW-5	05/24/93 1745	T-Metals, TDS, Hardness, NO2/NO3, SO4, Cl
SE-5	SE	Upgradient of upper tailings	6.0	N/A	N/A	N/A	N/A	N/A	07-103-SE-5	05/24/93 1745	T-Metals

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): Flow measured only at SW-1 due to unsafe high-flow conditions.

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? Two acres - wetlands present below both ponds already.

Wetlands present: Yes_X_, No___, Describe: Below toe of lower and upper dam, water is seeping out down drainage. Algae and ferric hydroxide precipitate were noted in lower pond seepage.

Carbonate rocks/soils: Yes___, No_X_, Describe:___

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100_X_; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments___

Nearest residence(ft or miles)? 1 mile west on Carpenter Creek Road

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS:

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (PERCENT)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
LT	Filamentous algae; FEOX precipitate below pile	Wet	360,000	270,000	Yes	High
UT	FEOX below in wetlands	Wet	319,500	223,650	Yes	High

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No X,
Describe:____

Population within 1 mile: 1-10___; 10-30 X; 30-100___; 100-300___;
300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments____

Evidence of recreational use on site: Yes X, No___, Describe: Clay pigeons from skeet shooting.

Accessibility - Fences, warning signs, closed roads? Unrestricted

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No X, Comment____
Wilderness Area - Yes___, No X, Comment____
T&E Species Habitat - Yes___, No X, Comment____
Bat Habitat - Yes___, No X, Comment____

Primary Drainage___; Secondary Drainage X; No Information___:

Riparian Habitat Quality - High___, Medium X, Low___
Wetlands Frontage - High___, Medium___, Low X
Fisheries Habitat and Species Classification - 6
Sport Fishery Classification - 6

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes___, No X, Number____, types and locations:____

Hazardous structures: Yes X, No___, Number____, types and locations: Several old abandoned cabins located between the upper and lower tailings ponds.

Unstable highwalls, pits, trenches, slopes: Yes___, No X, Number____,
types and locations:____

Unstable waste piles, impoundments, undercut banks: Yes X, No____,
Number 2, types and locations: Dam faces on both ponds are steep and have numerous logs and sticks protruding from their faces; faces are approx. 30 feet tall, actively mass wasting.

Fire and/or Explosion hazards: Yes X, No___, Explain: Cabins

DATE: November 15, 1990

CLIENT: Abandoned Mines

FIELD ID: Carpenter Creek Tailings

LAB NO: W8769

DATE RECEIVED: 10/08/90

Hardness 39 mg/L as $CaCO_3$

Total Metals

As <0.1 mg/L

Cd <0.005 mg/L

Cu 0.02 mg/L

Fe <0.03 mg/L

Pb <0.07 mg/L

Zn 0.84 mg/L

Bibliography

MBMG, Geology and Ore Deposits of the Neihart Mining District, Cascade County, Montana, Memoir No. 13, Montana School of Mines, Butte, Montana, Written by Paul A. Schafer, July, 1935.

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB, Environmental Assessment Analytical Data for Carpenter Creek Tailings, Prepared by MSE, Inc., October 29 and November 15, 1990.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for the Carpenter Creek Tailings, Prepared by Chen-Northern, September 8, 1989.

MSE, Inc., Environmental Assessments for Carpenter Creek Tailings site and Neihart Mining District, February 15, 1991.

USBM, Mines and Mineral Deposits (Except Fuel), Cascade County, Montana, Information Circular 7589, Written by Almon F. Robertson, Completed in April, 1950.

USGS, Topographic Map, Neihart, Montana, 7 1/2 minute Quadrangle, 1961.

LABORATORY ANALYTICAL DATA

CARPENTER CREEK TAILINGS
PA NO. 07-103

MDSL AMRB/PIONEER 4/9/93

Carpenter Creek Tailings PA# 07-103
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER-TUESDAY
INVESTIGATION DATE: 6/24/93

SOLID MATRIX ANALYSES

Metals in soils — Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
07-103-LT-1	61.4	927	24.1	11	14.9 J	3450	42600	0.095 J	4720	31.9	7870	4.21 UJ	2370	1.16 U
07-103-LT-2	25.1	2820	30.6	5.49	9.22 J	2740	28600	0.071 J	3950	24.9	4940	3.59 UJ	2150	1.072 U
07-103-SE-1	73	1100	20.3	12.2	13.7 J	3440	43900	0.071 J	4090	30.7	9540	3.99 UJ	1790	NR
07-103-SE-3	139	905	34.2	21.5	11.5 J	3740	49500	0.062 J	4360	36.8	18500	4.06 UJ	1960	NR
07-103-SE-4	46.6	737	25.0	10.2	15.2 J	2670	38000	0.106 J	5030	34.7	6840	3.88 UJ	2090	NR
07-103-SE-5	34.5	168	12.4	8.72	9.27 J	2910	28000	0.045 J	2100	16.7	5100	3.33 UJ	1090	NR
07-103-UT-1	69.8	663	28.0	11.3	19.2	2850	47500	0.015 U	6830	45.8	4620	5.27 J	2990	1.194 U
07-103-UT-2	36.6	1200	21.3	9.93	16.1	1950	40700	0.019 U	6870	45.4	3750	5.24 J	2050	1.231 U
BACKGROUND	10.5	131	1.4	6.83	22.2	26.1	20600	0.048 U	607	15.6	667	3.39 UJ	548	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
07-103-LT-1	1.21	37.8	25.1	-13	0.09	0.5	0.61	15.9	9.16
07-103-LT-2	0.5	15.6	16.1	0.43	0.2	0.15	0.15	4.69	11.4
07-103-UT1	0.42	13.1	23.4	10.3	0.07	0.05	0.30	1.56	21.9
07-103-UT2	0.57	17.8	21.2	3.40	0.12	0.13	0.32	4.06	17.1

WATER MATRIX ANALYSES

Metals in Water — Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
07-103-SW-1	2.6	18.6	4.13	5.99 U	8.53 J	62.9 J	174	0.064 J	243	8.78 U	42	18.3 U	560	32.8
07-103-SW-3	2.17	18.3	4.5	5.99 U	5.1 J	62.2 J	226	0.15 J	249	8.78 U	45.8	18.3 U	549	32.9
07-103-SW-4	2.58	14.9	4.4	5.99 U	5 U	54.9 J	127	0.088 J	244	8.78 U	24.8	18.3 U	539	30.2
07-103-SW-5	2.81	15.8	3.37	5.99 U	6.67 J	56.2 J	148	0.083 J	252	9.57	30.4	18.3 U	526	28.4

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Wet Chemistry — Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
07-103-SW-1	83	< 5.0	14	< 0.05	NR
07-103-SW-3	85	< 5.0	17	< 0.05	NR
07-103-SW-4	74	< 5.0	14	< 0.05	NR
07-103-SW-5	74	< 5.0	10	< 0.05	NR

LEGEND

LT1 - Composite of subsamples LT-1A, -2A, -3A, and -4A.
LT2 - Composite of subsamples LT-1D, -2D, 3C, and 4B.
SE1 - Just above confluence of Carpenter Creek with Snow Creek approximately 730 feet from SE1.
SE3 - At PPE of lower tailings pond in Carpenter Creek.
SE4 - At PPE of upper tailings pond in Carpenter Creek.
SE5 - Upgradient of upper tailings pond in Carpenter Creek.
UT1 - Composite of subsamples UT1B, 2A, and 3B.
UT2 - Composite of subsamples UT1D, 2C, and 3C.
BACKGROUND - From Silver Dyke Adit (07-135-SS-1).
SW1 - Above Snow Creek confluence in Carpenter Creek.
SW3 - Same as sample SE3.
SW4 - Same as sample SE4.
SW5 - Same as sample SE5.

XRF ANALYSIS RESULTS

CARPENTER CREEK TAILINGS
PA NO. 07-103

Mine Name: Carpenter Creek Tailings PA# 07 – 103
XRF Field Analyses
Results in PPM
Page 1 of 2.

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
07 – 103 – LT1 – A		19235.6	6248.57	2416.92		5211.72	40109.5		2731.75	1727.59		156.717
07 – 103 – LT1 – B		19269.3	7332.93	2531.69		6736.19	45417.8		3439.72	2318.13		177.868
07 – 103 – LT1 – C		23738.4	5548.47	3277.54		4266.79	35732.5		2882.7	2025.55		105.492
07 – 103 – LT1 – D		22264.1	4345.32	1813.84		4227.46	26815.8		2252.27	1496.16		168.344
07 – 103 – LT2 – A		22112.1	5461.4	2451.36		4384.75	38430.3		2546.05	1570.45		154.828
07 – 103 – LT2 – B		19157.8	3253.2	1421.14		2991.15	31014.2		2622.62	1466.32		132.052
07 – 103 – LT2 – C		19335.2	3131.33	1338.8		2335.61	25470.3		2228.29	1001.73		140.311
07 – 103 – LT2 – D		23767	5039.87	2406.67		5818.58	31221.8	374.047 *	1826.12	1854.5		132.787
07 – 103 – LT3 – A		25680.5	7790.35	3290.63		4858.75	40944.2		2093.55	1821.54		143.292
07 – 103 – LT3 – B		22623.8	5474.31	2825		5242.01	40858.2		3496.21	2007.38		137.448
07 – 103 – LT3 – C		25202.6	5713.09	3610.27		4658.71	40957.3		3331.74	1624.23		138.213
07 – 103 – LT4 – A		18916.4	5942.09	2378.35		5200.93	38081.2		1608.82	1190.77		159.62
07 – 103 – LT4 – B		22683.3	7593.83	3237.6		8255.28	39725.9		945.208	2118.15		129.804
07 – 103 – LT4 – C		20434.6	5065.33	2237.49		5472.51	40174.7		3477.56	1938.01		126.968
07 – 103 – LT5 – A		24660.6	4667.79	3001.41		2266.71	42986.4		3183.23	1592.5		92.0795
07 – 103 – LT – 1		22123.3	7503.89	2419.21		5992.35	40706.8		1789.39	1433.8		178.717
07 – 103 – LT – 2		22110.3	4359.26	1617.58		5501.9	26158.7		1554.09	1374.47		154.621
07 – 103 – SE – 1		15616.7	8990.88	2667.52		4403.21	39536		2051.27	1213.94		200.445
07 – 103 – SE – 1A		16737.8	5446.43	1885.28		3659.99	32521.5		1459.91	899.526		197.211
07 – 103 – SE – 2		19958.8	7110.32	2703.41		4427.34	38921.8		2100.18	1250.41		188.902
07 – 103 – SE – 3		16519.2	8812.35	2159.74		5926	56848.9		3080.6	1564.04		221.907
07 – 103 – UT1 – A		23412.1	6146.06	2305.92		6867.38	42963.6		1577.82	1494.04		153.638
07 – 103 – UT1 – B		19411.5	5746.88	2234.07		7461.36	33922.7		661.072	1478.18		136.46
07 – 103 – UT1 – C		23072	7256.99	3065.69		5769.45	37399.7		1074.58	1324.43		139.19
07 – 103 – UT1 – D		22444.5	6948.66	2326.81		5739.2	40808.7		1944.99	1415.49		188.954
07 – 103 – UT1 – E		23833.5	6912.3	2488.7		6413.75	43117.6		1720.75	1124.66		158.662
07 – 103 – UT2 – A		24836.1	7264.07	3006.13		4900.37	36813.7		1428.52	1583.37		132.53
07 – 103 – UT2 – B		24471.2	8259.32	3442.77		6962.92	41594.8		1969.24	1698.21		127.22
07 – 103 – UT2 – C		27022.6	7517	2467.12		6633.35	36311.8		1838.63	1691.77		121.881
07 – 103 – UT2 – D		16565	8110.45	1793.32	139.541 *	1301 *	20674.4		294.087	306.744		334.186
07 – 103 – UT3 – A		26911.8	8471.72	3467.26		5568.78	41578.6		1252.83	1305.04		159.178
07 – 103 – UT3 – B		25909.6	7116.27	3247		7351.84	42270.9		1421.93	1536.61		157.937
07 – 103 – UT3 – C		21696	6947.71	2831.79		7076.29	35596.4		1355.42	1674.32		131.953

Mine Name: Carpenter Creek Tailings PA# 07 – 103
XRF Field Analyses
Results in PPM
Page 2 of 2.

XRF SAMPLE ID	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
07 – 103 – LT1 – A	213.232		22.1785	4836.37	195.421	136.8		2798.9	91.6067		48.8983
07 – 103 – LT1 – B	227.714		29.9569	6346.65	211.725	140.542 *		3473.71	148.11 *		38.9038 *
07 – 103 – LT1 – C	102.772		32.7511	4972.28	225.421			2398.55	131.413 *		32.2814 *
07 – 103 – LT1 – D	148.377		73.1421	3145.47	211.902	104.162 EV		5344.43	92.6295 EV		43.1892 EV
07 – 103 – LT2 – A	201.77		16.3547 *	5362.87	197.288			1862.25	112.78 *		24.6484 *
07 – 103 – LT2 – B	192.582		72.6631	4549.78	161.671		42.7844 *	4307.5	104.427 *		35.8782 *
07 – 103 – LT2 – C	167.925		85.5311	3262.25	163.328			4985.04	90.6685 *		33.0465 *
07 – 103 – LT2 – D	162.703		27.8111	3495.91	229.725			3074.93	111.815 *		33.5723 *
07 – 103 – LT3 – A	99.1468		16.8604 *	5135.9	271.761	176.953 *		2126.46	106.043 *		41.6244 *
07 – 103 – LT3 – B	165.577		40.1355	7656.01	212.359			3209.21	152.326 *		44.0172 *
07 – 103 – LT3 – C	132.598		14.6062 *	6663.29	222.219			2375.68	149.751 *		23.652 *
07 – 103 – LT4 – A	201.146		12.8883 *	3585.33	189.478			2503.87	112.369 *		32.0331 *
07 – 103 – LT4 – B	158.697		11.3483 *	1623.22	222.984			1627.64	85.442 *		
07 – 103 – LT4 – C	202.383		41.4753	5497.95	210			2942.52	150.984 *		38.5184 *
07 – 103 – LT5 – A	53.2378		18.0483 *	7790.22	280.128			1567.73	188.697 *		41.5969 *
07 – 103 – LT – 1	230.357		7.91587 *	3456.53	201.197			2092.83	100.682 *		32.246 *
07 – 103 – LT – 2	175.052		52.3	2542.92	220.51			4588.59	120.132 *		35.7701 *
07 – 103 – SE – 1	501.882		18.1005 *	4867.09	160.81			1909.34			29.5172 *
07 – 103 – SE – 1A	164.795		15.4886 *	3860.85	153.856			1491.11	95.5295 *		
07 – 103 – SE – 2	325.544		17.9582 *	5870.99	175.059			2359.22	168.039 *		20.7599 *
07 – 103 – SE – 3	1172.1		37.5618 *	9941.59	158.305			8356.41	150.048 *		27.3081 *
07 – 103 – UT1 – A	209.133			3004.83	234.32			1448.18	106.026 *		20.7816 *
07 – 103 – UT1 – B	153.561		8.21591 *	1438.72	225.622	111.321 *		1643.18	86.3184 *		12.9784 *
07 – 103 – UT1 – C	130.716		7.52376 *	2778.26	225.727			1752.98	121.253 *		30.8886 *
07 – 103 – UT1 – D	221.675		11.8742 *	3433.88	210.835			2085.69	128.752 *		23.4787 *
07 – 103 – UT1 – E	173.744			3994.36	203.785			1565.31	118.479 *		40.211 *
07 – 103 – UT2 – A	143.477			3834.21	269.783			1481.44	79.0465 *		37.6543 *
07 – 103 – UT2 – B	115.083			4499.1	261.705			1918.12	138.463 *		30.1401 *
07 – 103 – UT2 – C	88.8936		6.97282 *	4722.02	268.354			2255.28	148.129 *		42.0759 *
07 – 103 – UT2 – D	232.993		52.223	415.181	121.013			869.618	94.0514 *	17.5293 *	27.5979 *
07 – 103 – UT3 – A	130.703			2786.78	273.268			1759.87	127.579 *		24.0982 *
07 – 103 – UT3 – B	142.848			3778.33	237.501			2160.63	152.812 *		20.3055 *
07 – 103 – UT3 – C	140.233			2954.23	244.943			1819.59	157.615 *		28.9463 *

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

CARPENTER CREEK TAILING
PA NO. 07-103

AIMSS SCORESHEET

SITE NAME: CARPENTER CK TAILINGS
PA NUMBER: 07-103

GROUNDWATER PATHWAY

LINE NO.				
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	421.186
6	GW - TARGETS	WELLS - 1 MI. x 2.5		5.0
7		WELLS - 1 TO 4 MI		25
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	30.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	5054232

SURFACE WATER PATHWAY

11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		300
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	700
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	466.706
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		1
18		WETLANDS		10
19		FISHERY		0
20		RECREATION		5
21		IRRIGATION/STOCK		0
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 - 22	16
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	5227107

AIR PATHWAY

25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		20
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	100
27		LIKELIHOOD SCORE	LINES 25 + 26C	100
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	12.607
29	AIR - TARGETS	POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		0
31		WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 - 33	30
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	37821

DIRECT CONTACT PATHWAY

36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		50
37A		ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	150
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	11.370
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		10
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		10
43		TARGETS SCORE	SUM LINES 40 - 42	20
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	34110

45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000	**103.53**

SITE NAME: CARPENTER CK TAILINGS
PA NUMBER: 07-103

SITE SAFETY

LINE NO.				
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 - 7	0
9		POPULATION - 1 MILE		10
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		10
12		TARGETS SCORE	SUM LINES 9 - 11	20
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**0.00**

SUMMARY OF HISTORICAL ANALYTICAL DATA
FROM OTHER SOURCES

FIELD DATA
SHEETS (ASK BILL)

NEIHART MINING DISTRICT WATER QUALITY FIELD PARAMETERS

SITE NAME: NEIHART TAILINGS
DATE: 16-Aug-90

STATION	FLOW (cfs)	pH (s.u.)	SPECIFIC CONDUCTANCE (umhos/cm)	TEMP. (celcius)	COMMENTS
BELT CK (UPGRADIENT)	17.6	7.45	134	14.5	SAMPLE COLLECTED
BELT CK (DOWNGRADIENT)		7.53	125	14.8	SAMPLE COLLECTED

SITE NAME: SILVER DIKE MINE
DATE: 14-Aug-90

STATION	FLOW (gpm)	pH (s.u.)	SPECIFIC CONDUCTANCE (umhos/cm)	TEMP. (celcius)	COMMENTS
ADIT	20	5.48	1800	9.0	SAMPLE COLLECTED, ALKALINITY = 25 MG/L AS CAC
CARPENTER CK (ABV TAILS)		7.43	54	7.9	CARPENTER CK ABOVE TAILS DISCHARGE
STREAM (BLW TAILS)	5	7.74	132	15.0	STREAM FLOWS THRU FAILED TAILINGS IMPOUNDMENT DOWN TO CARPENTER CK

SITE NAME: CARPENTER CREEK TAILINGS AND OTHER ASSOC. DRAINGAES
DATE: 20-Sep-90

STATION	FLOW (gpm)	pH (s.u.)	SPECIFIC CONDUCTANCE (umhos/cm)	TEMP. (celcius)	COMMENTS
CARPENTER CK (ABV UPPER POND)		7.24	123	11	MEASURED ABV MOUTH OF MCKAY CK
CARPENTER CK (BLW LOWER POND)		6.60	208	10.5	MEASURED ON SEPTEMBER 26, 1990
MCKAY CREEK (@ CULVERT)		7.32	146	9.3	
HAYSTACK CREEK (@ CULVERT)		6.56	140	9.1	
SNOW CREEK (@ CARPENTER CK)		6.76	129	8.2	

TABLE 1-2

COMPARISON OF SURFACE WATER FROM THE CARPENTER CREEK TAILINGS SITE WITH STATE STANDARDS

	Surface Water Up stream of Carpenter Creek Tailings[a] mg/l	Surface Water Down stream of Carpenter Creek Tailings[a] mg/l	Cold Water Aqueous[b] mg/l	Drinking Water[b] mg/l	Irrigation[b] mg/l	Livestock[b] mg/l
As	<0.001	<0.1	0.44	0.05	0.10	0.20
Cd	0.0068	<0.005	0.003	0.01	0.05	0.05
Cu	<0.02	0.02	0.012	1.0	5.0	0.05
Fe	<0.04	<0.03	1.0	0.3	20.0	NA
Pb	0.005	<0.07	0.004	0.05	10.0	0.10
Zn	1.08	0.84	0.037	5.0	10.0	25.0
pH	7.24	6.68	6.5-8.5	6.5-8.5	4.5-9.0	NA
Hardness	69	39				
Specific Conductance[c]	123	208				

[a] Total extractable metals

[b] Montana Department of Health and Environmental Sciences (MDHES), 1984

[c] umhos/cm

NA Not Applicable

TABLE 1-1

CONCENTRATION OF METALS IN UPPER CARPENTER CREEK TAILINGS PONDS SAMPLE

Metals	Carpenter Creek Tailings (mg/kg)
As	164
Cd	23
Cu	1,670
Fe	49,700
Pb	4,740
Zn	2,810
pH	7.70

DATE: October 29, 1990

CLIENT: Abandoned Mines

FIELD ID: Neihart District, Upper Carpenter Creek Tailings Pond

LAB NO: S2718

DATE RECEIVED: 09-24-90

pH (1:1 slurry) 7.70 SU

Total Metals

As 164 mg/Kg

Cd 23 mg/Kg

Cu 1670 mg/Kg

Fe 49,700 mg/Kg

Pb 4740 mg/Kg

Zn 2810 mg/Kg

DATE: November 15, 1990

CLIENT: Abandoned Mines

FIELD ID: Carpenter Creek Upstream of Carpenter Creek Tailings Pond (Upper)

LAB NO: W8633

DATE RECEIVED: 09/24/90

Hardness 69 mg/L as $CaCO_3$

Total Metals

As <0.001 mg/L

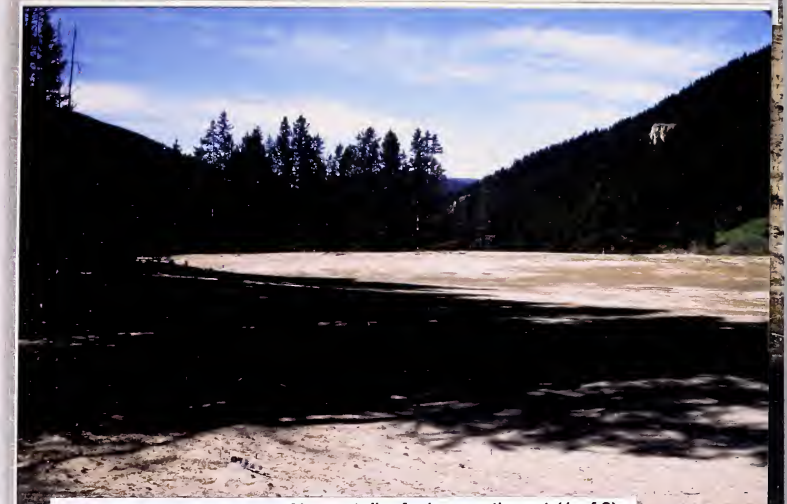
Cd 0.0068 mg/L

Cu <0.02 mg/L

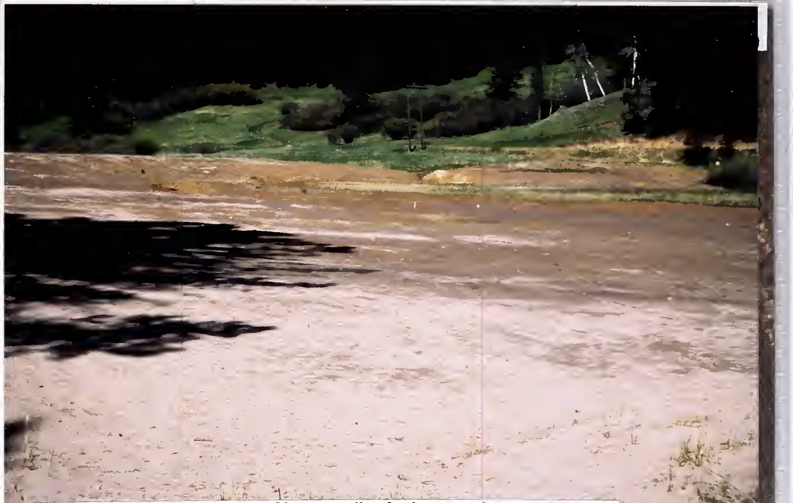
Fe <0.04 mg/L

Pb 0.005 mg/L

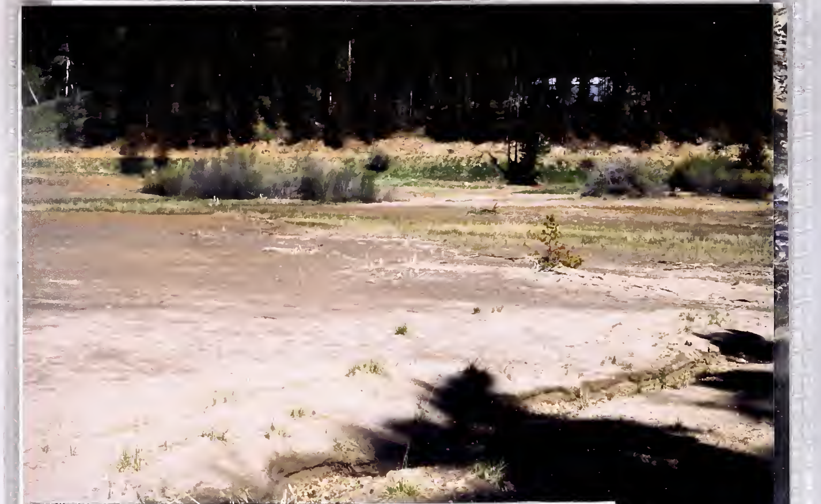
Zn 1.08 mg/L



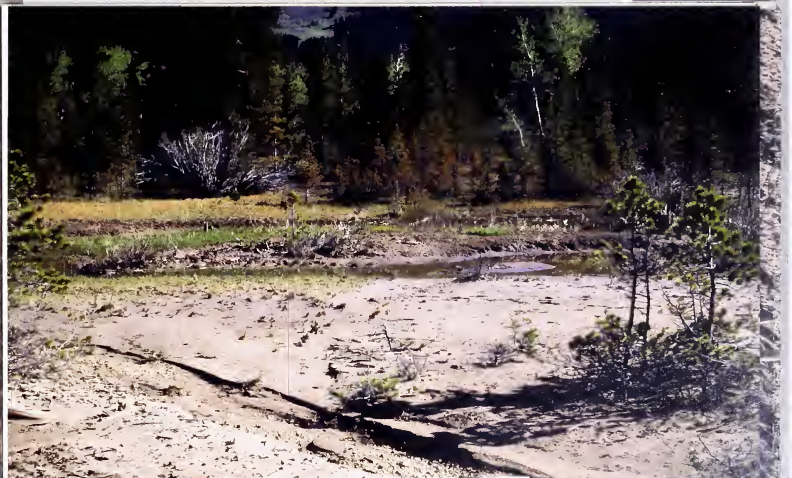
07-103, #1: Panorama of lower tails, facing southwest (1 of 3)



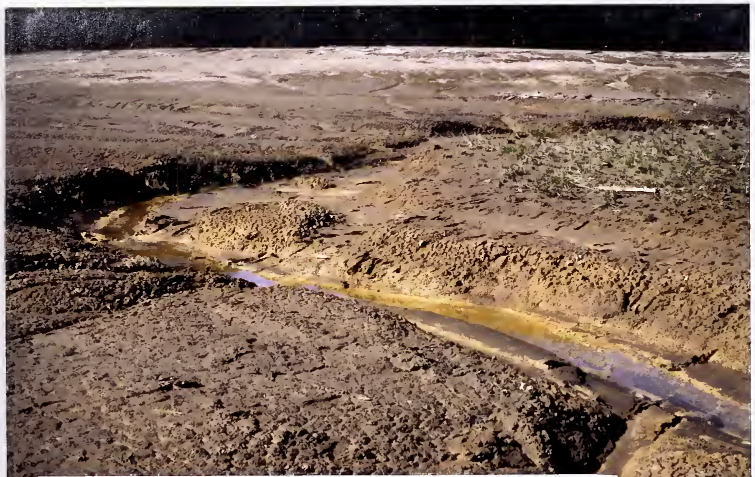
07-103, #2: Panorama of lower tails, facing southwest (2 of 3)



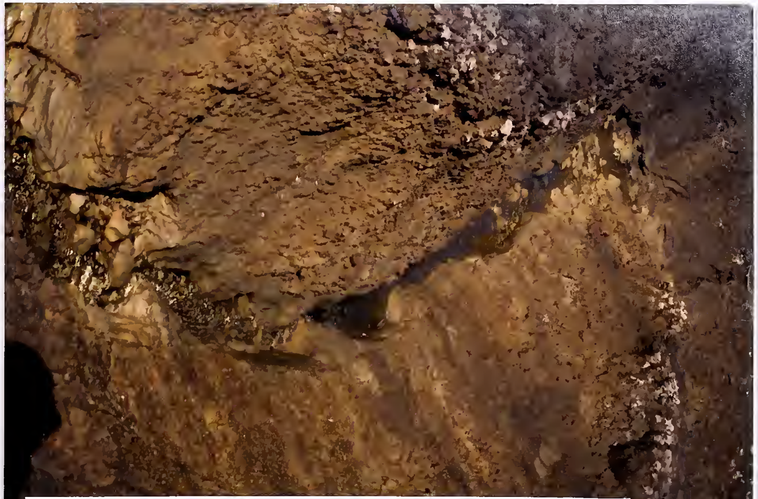
07-103, #3: Panorama of lower tails, facing southwest (3 of 3)



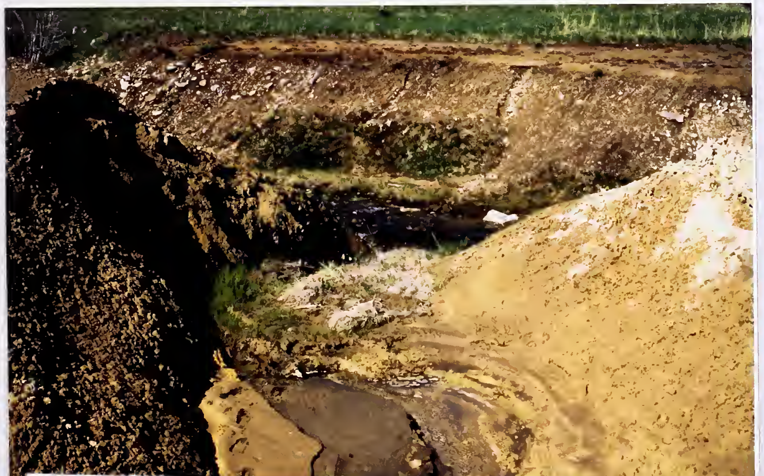
07-103, #4: Surface water enters tailings from the east



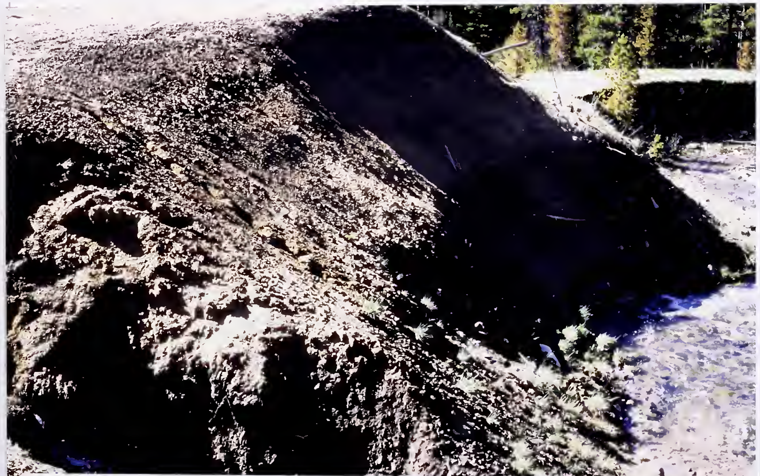
07-103, #5: Surface water running across lower tails, facing south



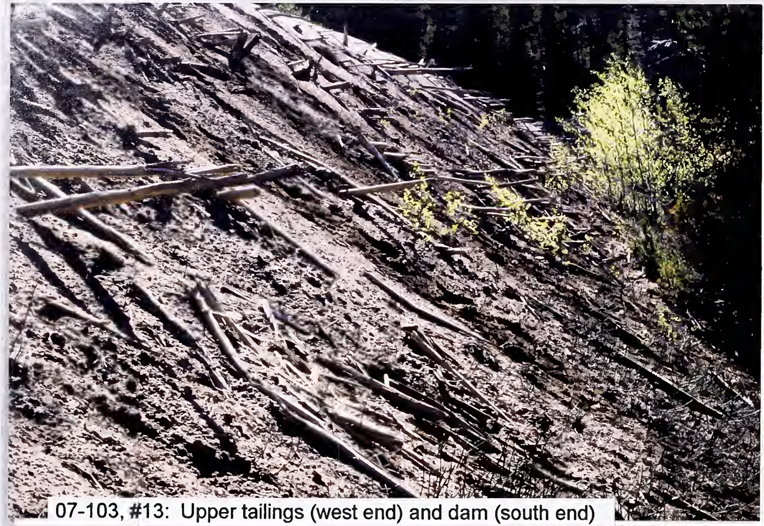
07-103, #6: Surface water flowing northwest across lower tails

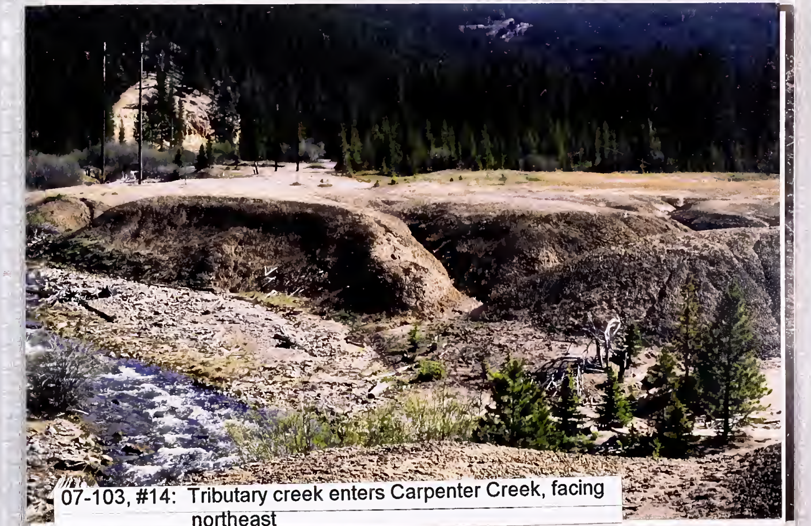


07-103, #7: Tributary creek enters Carpenter Creek, facing northwest



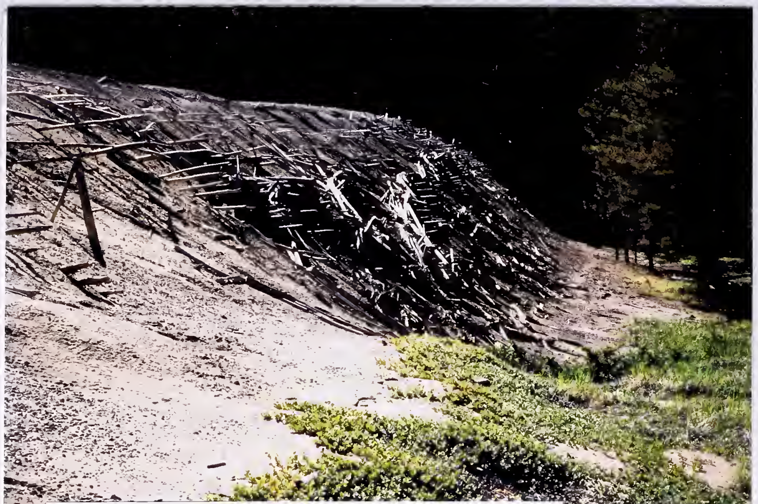
07-103, #8: Tributary creek enters Carpenter Creek, facing west

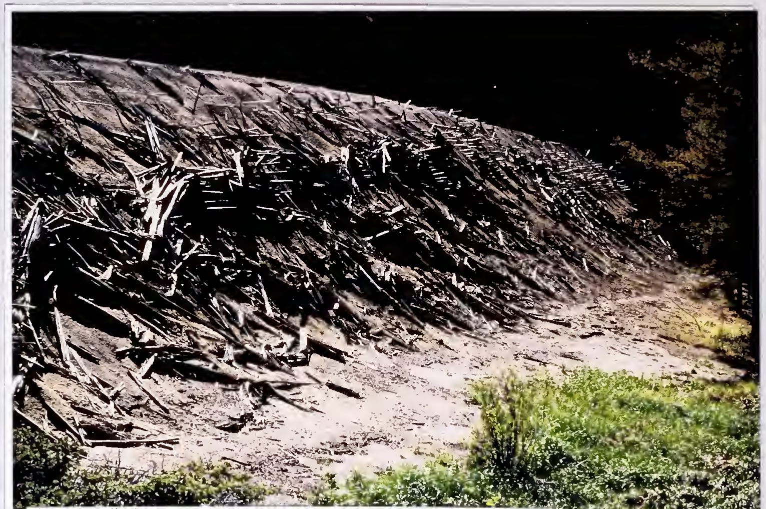

07-103, #13: Upper tailings (west end) and dam (south end)

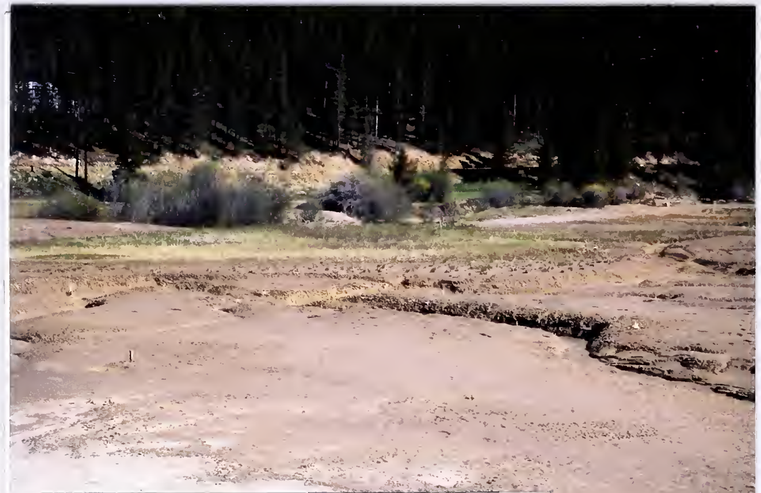

07-103, #14: Tributary creek enters Carpenter Creek, facing northeast

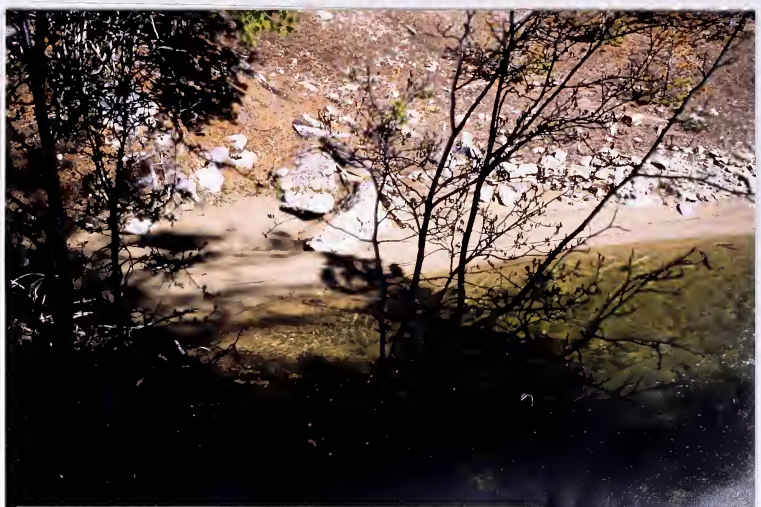
07-103, #15: Tributary creek enters upper tailings (west end), facing north

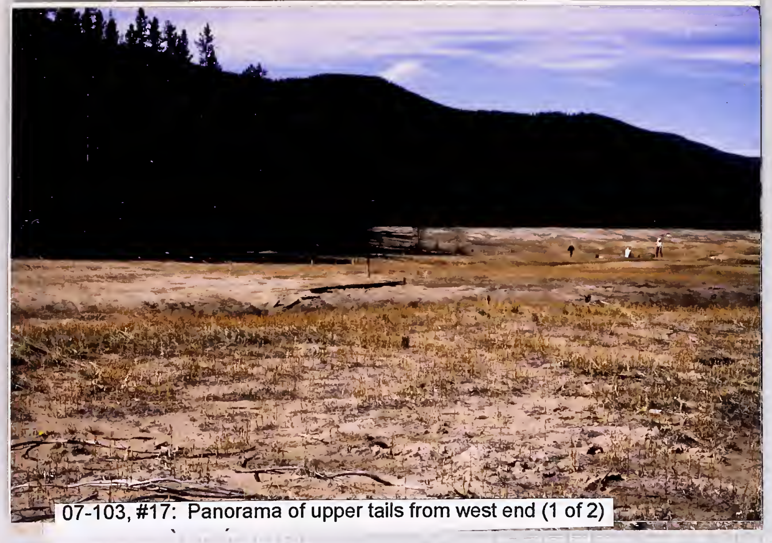
07-103, #16: Water drainage into upper tailings

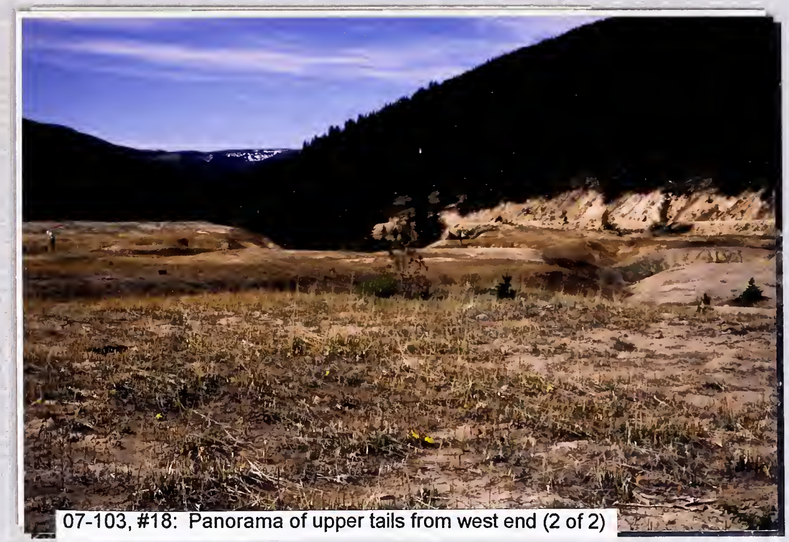

07-103, #9: West end of lower tailings dam, facing south

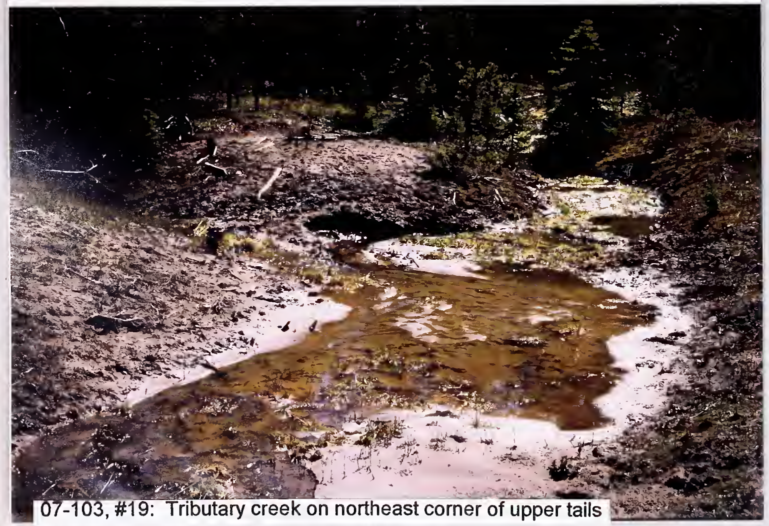

07-103, #10: West end of lower tailings dam, facing south

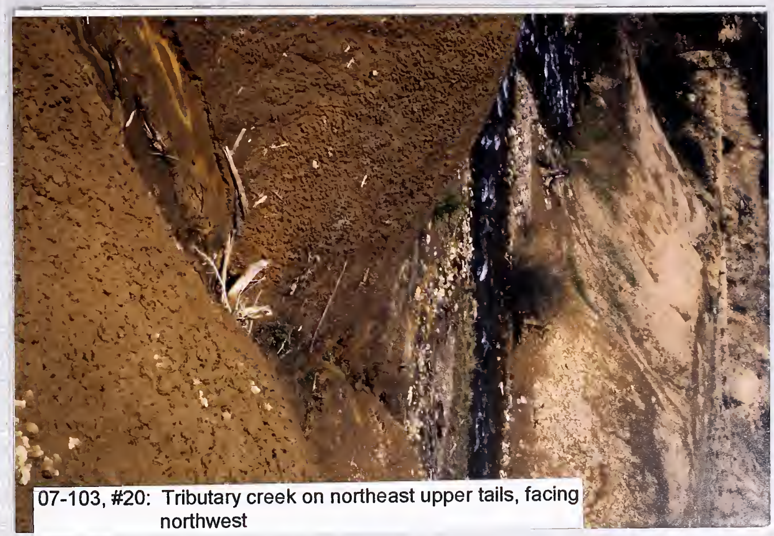

07-103, #11: Surface water drainage, facing northeast

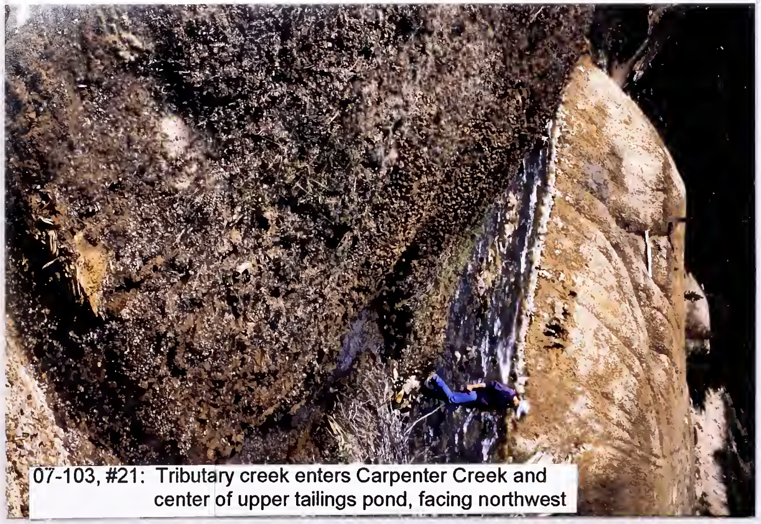

07-103, #12: Carpenter Creek tails washout, facing north


07-103, #17: Panorama of upper tails from west end (1 of 2)

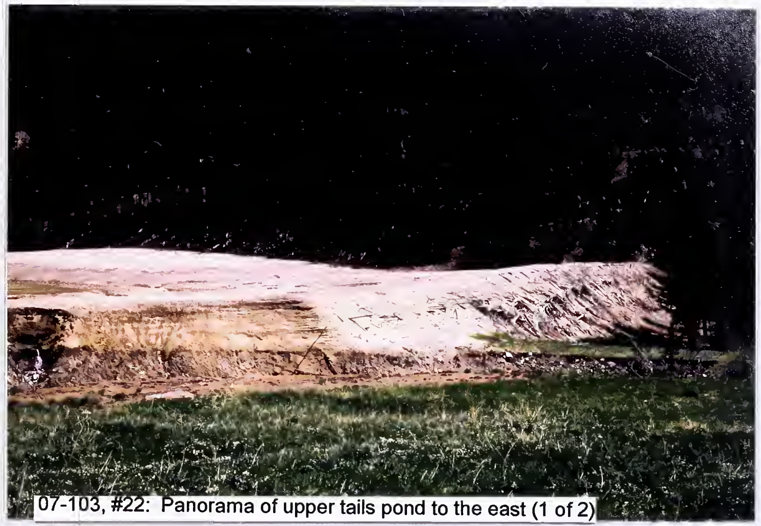

07-103, #18: Panorama of upper tails from west end (2 of 2)


07-103, #19: Tributary creek on northeast corner of upper tails

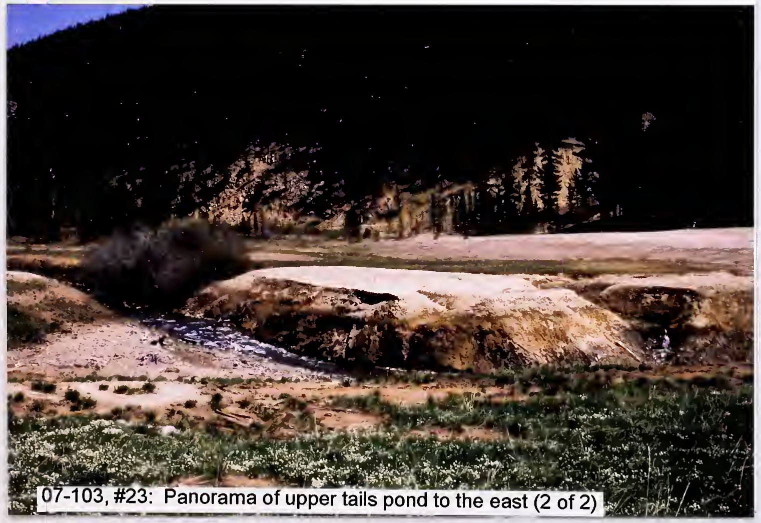

07-103, #20: Tributary creek on northeast upper tails, facing northwest



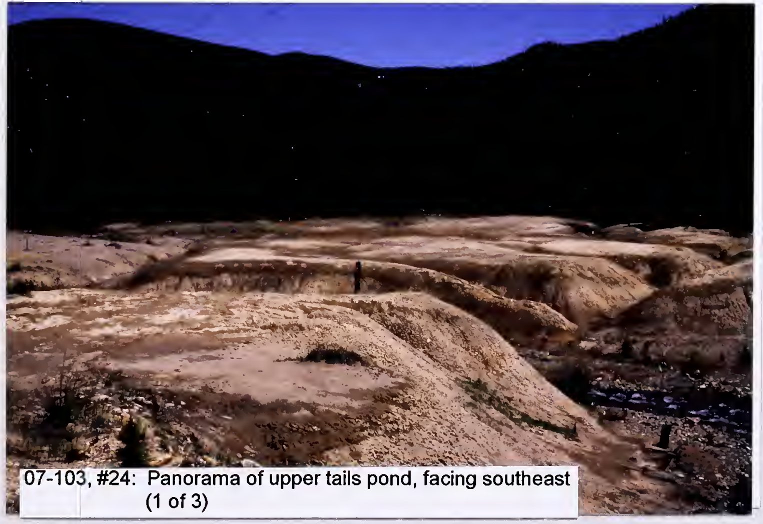
07-103, #21: Tributary creek enters Carpenter Creek and center of upper tailings pond, facing northwest



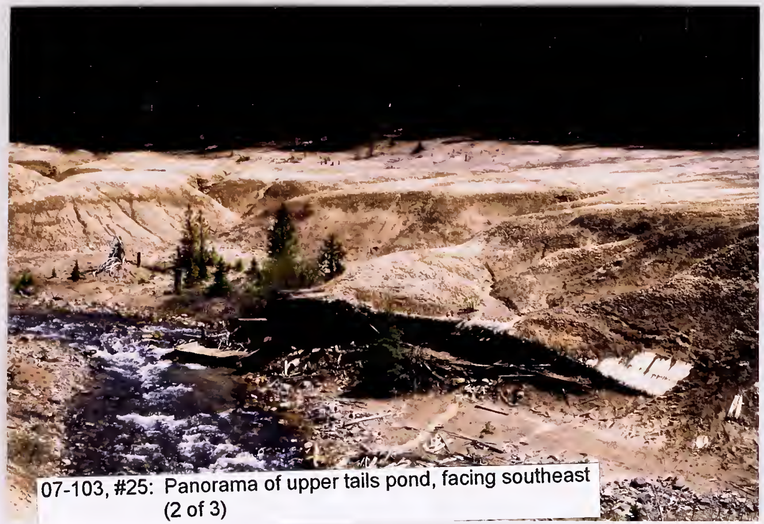
07-103, #22: Panorama of upper tails pond to the east (1 of 2)



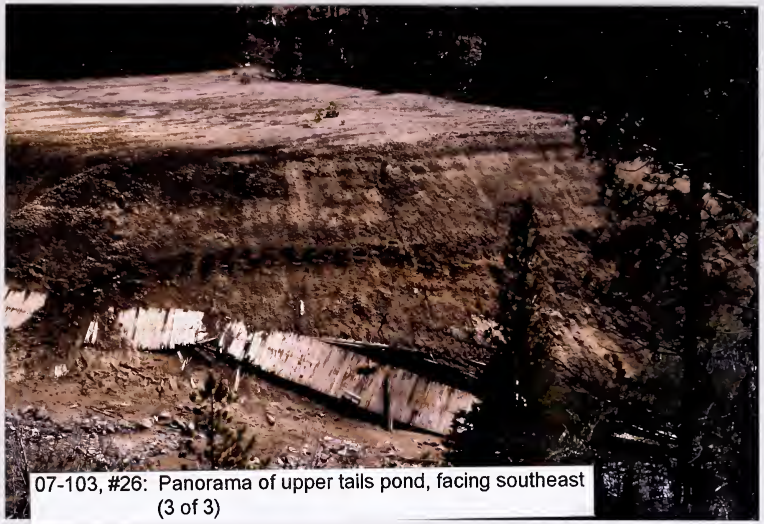
07-103, #23: Panorama of upper tails pond to the east (2 of 2)



07-103, #24: Panorama of upper tails pond, facing southeast (1 of 3)



07-103, #25: Panorama of upper tails pond, facing southeast (2 of 3)



07-103, #26: Panorama of upper tails pond, facing southeast (3 of 3)

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: ROCHESTER **PA#:** 07-110

Date: June 2, 1993 **Time:** 0830

Field Team Leader: Tuesday, Pioneer

Sampling Personnel: Belanger, Pioneer
Lasher, Pioneer

Visitors: None

Weather/Seasonality Observations: Rain in the morning, mostly cloudy in the afternoon; wet, cool spring.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number)**:** Roll #1: #31: WR-1 associated with Adit #1; #32: Collapsed adit; #33: Shaft #4, HMO; #34: Shaft #4, dump WR-2; #35: Shaft #3, HMO; #36: Shaft #3, dump WR-3; #37: Shaft #2, HMO. Roll #2: #1: Shaft #1, HMO; #2,#3: Shaft #1, dump WR-5; #4: Shaft #2, dump WR-4; #5: Adit #2, dump WR-6; #6: Adit #2; #7: Dump and tails, Adit #2.

General Comments/Observations (not covered specifically in attached Inventory Forms)**:** N/A

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Move WR-6 complex (3 piles) out of active stream (Rock Creek); other dumps are fine, but recontour or allow natural revegetation to continue.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): ROCHESTER PA#: 07-110

Legal Description: T 14N ;R 8E ;Sec. 29 , SE1/4SE 1/4 1/4

County: CASCADE Mining District: NEIHART

Latitude: N 46° 56' 24" Longitude: W 110° 43' 46"

Primary Drainage Basin and Code: Belt Creek/10030105
Secondary Drainage Basin: Rock Creek

USGS Quadrangle map name(s): Neihart

Mine Type/Commodities: Hardrock/Gold, Silver, Zinc, Lead

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Private/Public
Owner, Agent, or Contact(Include address and phone when available): Peter Antonioli, Alexandra Resources Co., P.O. Box 791, Butte, MT 59702. (406) 723-8730; Lewis and Clark National Forest.

Relationship to other mines/sites in the area/district: Moulton site is downdrainage; Dacotah, Fairplay and Silver Belt sites are up drainage from this site.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 6100', Slope 24°,
Aspect West to Northwest

Land use: Mining___, Recreational X , Residential___, Urban___,
Agricultural___, Other(Specify)

Area of disturbed/unvegetated lands? 3.2 acres.
Dimensions: 700 feet x 200 feet

Predominant vegetation types: Lodgepole pine forest

Access: roads - good___,poor___,4wd X ,trail___.
Other logistical considerations (proximity to other sites). Access on road past the Broadwater, Hartley, and Atlantus mines; road is partly overgrown.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 3 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site is underlain by pinto diorite and gneisses. Rock Creek (perennial) flows through the site in a southwest direction and meets Belt Creek 1/2 mile below the site. Belt Creek flows northwest away from the confluence.

Mining/milling history, ore type/tenor, host rock, gangue: Vein deposit; ore minerals are galena, sphalerite, pyrite, and a small amount of chalcopyrite. Gangue minerals are quartz, ankerite, and barite. No other information available.

Mine Operation?
Shafts - Yes X, No ___, # 4, Comment Hazardous
Adits - Yes X, No ___, # 2, Comment Caved
Pits - Yes ___, No X, # ___, Comment ___
Placers - Yes ___, No X, # ___, Comment ___
Other - Yes ___, No X, # ___, Comment ___

Mill Operation? Yes ___, No X. If yes answer the next three questions:

Period(s) of Operation: N/A

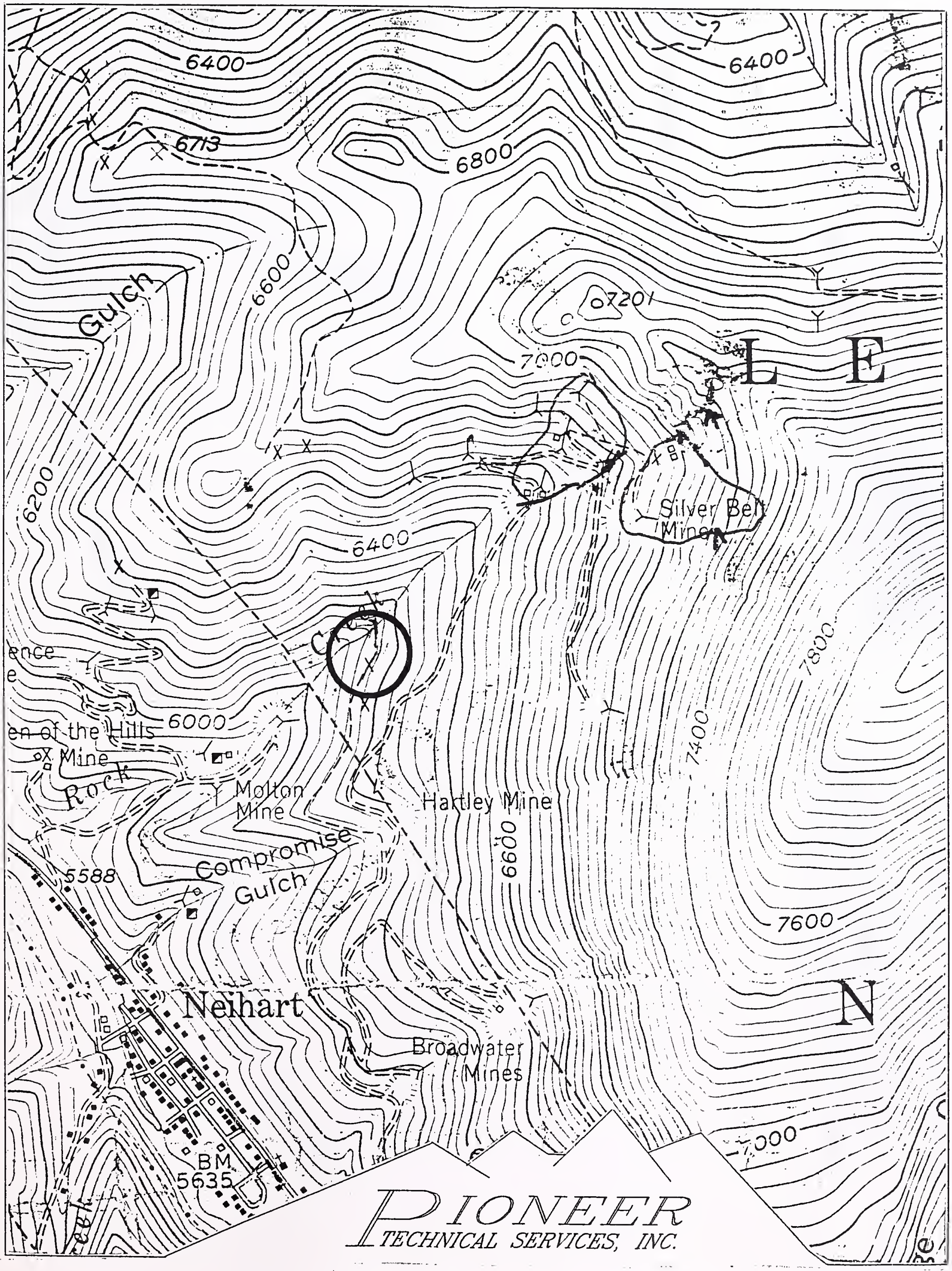
Origin of Ore Milled - Custom Mill ___ Dedicated Mill ___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN^- leach (vat, heap), floatation, smelting?
N/A

Montana Bureau of Mines and Geology
Water Well Log Data

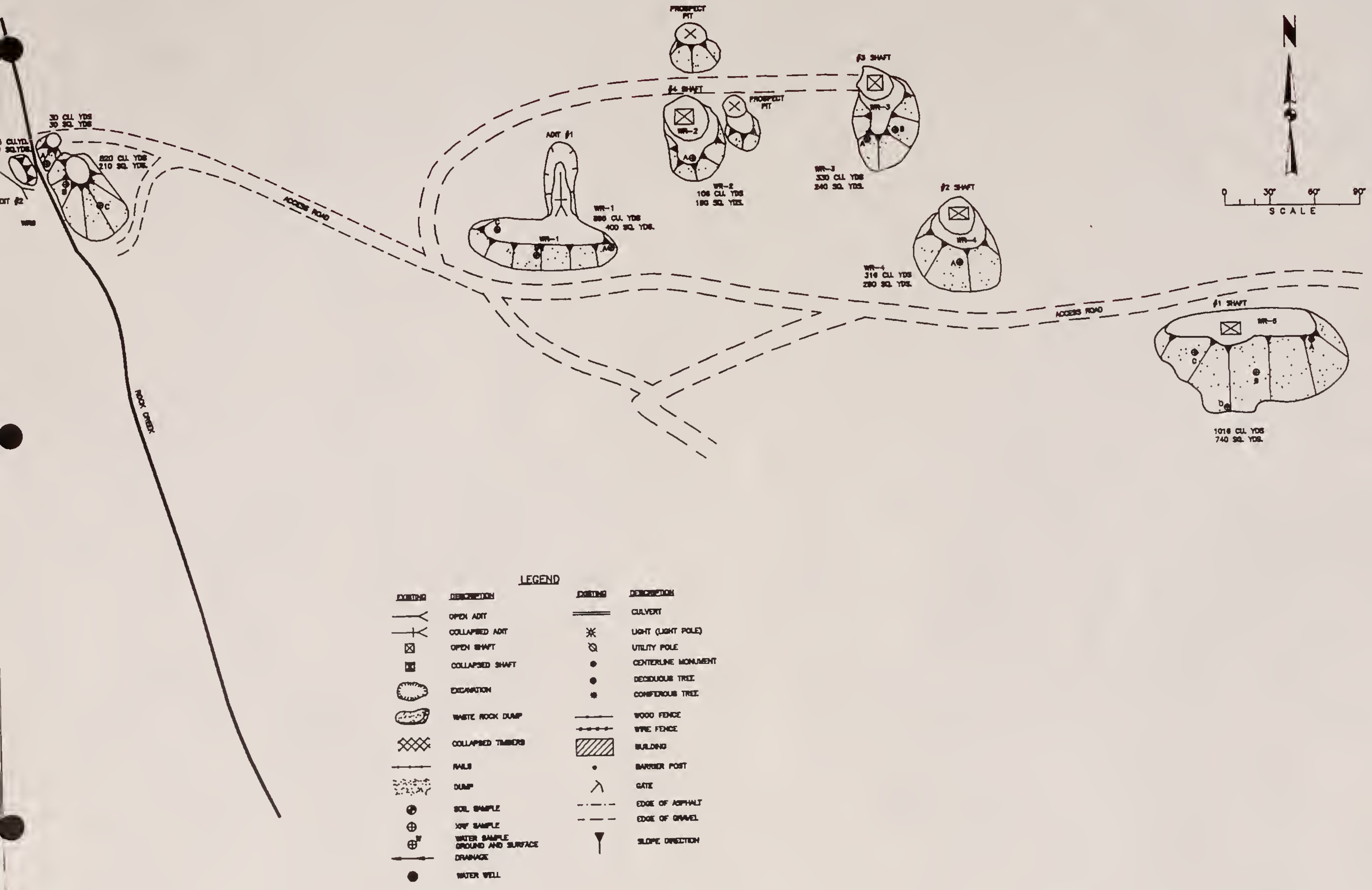
10/22/1993

Well No.	Location	Depth	Yield	Static Water Level
M:123062	14N 08E 20 DBA	41.0	4.0	24.00
M:123061	14N 08E 20 DBA	40.0	7.0	0.00
M:25649	14N 08E 32 BDC	120.0	8.0	7.00



ROCHESTER, P.A. NO. 07-110

T14N, R08E, SECTION 29
SCALE: 1" = 1000'



DRAWN MWC DATE 8/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

PIONEER

TD&H

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS-BOZEMAN-KALISPELL MONTANA
SPOKANE WASHINGTON

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

ROCHESTER PA# 07-110
NEIHART DISTRICT CASCADE COUNTY

SHEET NO.

07-110.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Tuesday, Belanger, Lasher

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	895	Associated with Adit #1; east end of WR-1	None	6.8 (D)	0.04	N/A	N/A	XRF Analysis
WR-1B	WR		Associated with Adit #1; center of WR-1	None	6.8 (D)	0.04	N/A	N/A	XRF Analysis
WR-1C	WR		Associated with Adit #1; west end of WR-1	None	6.4 (D)	0.05	N/A	N/A	XRF Analysis
WR-2A	WR	106	Associated with Shaft #4; center of WR-2	None	6.4 (D)	0.04	N/A	N/A	XRF Analysis
WR-3A	WR	330	Associated with Shaft #3; west end of WR-3	None	6.5 (D)	0.04	N/A	N/A	XRF Analysis
WR-3B	WR		Associated with Shaft #3; east end of WR-3	None	6.7 (D)	0.04	N/A	N/A	XRF Analysis
WR-4A	WR	316	Associated with Shaft #2; center of WR-4	None	6.4 (D)	0.06	N/A	N/A	XRF Analysis
WR-5A	WR	1,016	Associated with Shaft #1; east end of WR-5	None	6.4 (D)	0.06	07-110-WR-5	06/02/93 1550	T-Metals, ABA
WR-5B	WR		Associated with Shaft #1; center and top of WR-5	None	6.0 (D)	0.06			
WR-5C	WR		Associated with Shaft #1; west end of WR-5	None	6.4 (D)	0.06			
WR-5D	WR		Associated with Shaft #1; center and bottom of WR-5	None	6.3 (D)	0.06			
WR-6A	WR	615	Associated with Adit #2; north end of small northern dump, in Rock Creek	None	6.2 (D)	0.04	07-110-WR-6	06/02/93 1630	T-Metals, ABA
WR-6B	WR		Associated with Adit #2; north end of large dump, in Rock Creek	None	6.0 (D)	0.04			
WR-6C	WR		Associated with Adit #2; south end of large dump, in Rock Creek	None	5.8 (D)	0.04			
WR-6D	TAIL		Upstream in Rock Creek	None	3.9 (D)	NM			

* D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 07-110-WR-5 is composite of WR-5A through -5D. 07-135-WR-6 is composite of WR-6A, -6B, and -6C. NM = Not Measured.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No_X_, Number:____ Identification:______________

Filled shafts: Yes___, No_X_, Number:____ Identification:______________

Seeps/Springs: Yes___, No_X_, Number:____ Identification:______________

Groundwater wells within 4 miles?: Yes_X_, No___;
Number of well logs: 13

Distance to nearest well used for drinking? 1/2 mile to the town of Neihart.

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible_X__, Unlikely____.
Elevated metal values in uncontained dumps; two dumps in drainages.

Other observations/notes: Shaft #1 dump (WR-5) in dry drainage and Adit #2 dumps in Rock Creek.

GROUNDWATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

____

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X , No ___, Name(s): Rock Creek through Adit #2 dump (WR-6).

Dry streambeds: Yes X , No ___, Name(s): At bottom of Shaft #1 dump (WR-1).

Other surface water: Yes ____, No X , Name(s)/Description: ____

Waste materials within any floodplain: Yes X , No ___ Source ID(s): WR-6 in Rock Creek as are tailings from upstream source.

Approximate Flood frequency? X 1 yr, ___10 yr, ___100 yr

Estimated seasonal flow of stream(s) (cfs)? 2 cfs
High Flow: 11 cfs , Average Flow: 1.5 cfs

Distance between waste source(s) and nearest surface water body (ft)? 0 feet from WR-6 to Rock Creek.

Surface water draining onto or through waste sources: Yes X , No ____,
Describe: Rock Creek

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Probably none in Rock Creek; Belt Creek has fishery, wetland, and possible agriculture, residential, irrigation, and recreation.

Observed erosional/sedimentation/stream turbidity problems? Yes X ,
No _____, Distance downstream (ft)? Unknown Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
Waste rock material in Rock Creek, as are tailings from an upstream source.

SURFACE WATER INVENTORY FORM

SAMPLERS: Tuesday, Belanger

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	Upstream from adit in Rock Creek	5.94	420	N/A	N/A	N/A	2 cfs (E)	N/A	N/A	Field Parameters
SW-2	SW	Downstream in Rock Creek	5.77	330	N/A	N/A	N/A	2 cfs (E)	N/A	N/A	Field Parameters

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides? (SO_3)

Presence of evaporative salt deposits? (ESD)

Discolored or turbid seepage? (SPG)

Presence of long filamentous algae in drainages, mosses in moist areas?

Presence of ferric hydroxide precipitates? (FEOX)

Presence of burned or stressed vegetation? (VEG)

pH ≤ 5.0 (pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 2 acres

Wetlands present: Yes___, No X , Describe:

Carbonate rocks/soils: Yes___, No X , Describe:

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X ; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 1/2 mile

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Tuesday, Belanger

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	FEOX in dump; SO3	Dry	3,600	2,880	Yes	Low
WR-2	FEOX in dump	Dry	1,710	1,026	No	None
WR-3	FEOX in dump	Dry	2,160	1,512	No	None
WR-4	FEOX in dump	Dry	2,610	1,305	No	None
WR-5	FEOX in dump; SO3	Dry	6,660	6,660	Yes	Moderate
WR-6	FEOX in dump; SO3; FEOX in stream; pH	Dry	2,430	1,944	Yes	Moderate

Notes and Clarifications: ______

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No X ,
Describe:__________

Population within 1 mile: 1-10___; 10-30___; 30-100 X ; 100-300___;
300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments__________

Evidence of recreational use on site: Yes___, No X , Describe:________

Accessibility - Fences, warning signs, closed roads? Unrestricted

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No X , Comment________
Wilderness Area - Yes___, No X , Comment________
T&E Species Habitat - Yes___, No X , Comment________
Bat Habitat - Yes___, No X , Comment________

Primary Drainage___; Secondary Drainage X ; No Information___:

Riparian Habitat Quality - High___, Medium X , Low___
Wetlands Frontage - High___, Medium___, Low X
Fisheries Habitat and Species Classification - Not Rated
Sport Fishery Classification - Not Rated

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes X , No___, Number 4 , types and locations:
Shafts at WR-2, WR-3, WR-4 and WR-5

Hazardous structures: Yes___, No X , Number____, types and locations:_

Unstable highwalls, pits, trenches, slopes: Yes X , No___, Number 1 ,
types and locations: WR-6 is undercut by Rock Creek and has an unstable highwall.

Unstable waste piles, impoundments, undercut banks: Yes X , No____,
Number 1 , types and locations: WR-6 is undercut by Rock Creek and is unstable.

Fire and/or Explosion hazards: Yes___, No X , Explain:________

Bibliography

MBMG, Geology and Ore Deposits of the Neihart Mining District, Cascade County, Montana, Memoir No. 13, Written by Paul A. Schafer, July 1935.

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL, Environmental Assessment Data for Rochester, Prepared by MSE, Inc., August 15, October 4, and October 29, 1990.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for the Rochester site, Prepared by Chen-Northern, September 17, 1989.

USBM, Mines and Mineral Deposits (Except Fuel), Cascade County, Montana, Information Circular 7589, Written by Almon F. Robertson, Completed in April, 1950.

USGS, Topographic Map, Neihart, Montana, 7 1/2 minute Quadrangle, 1961.

LABORATORY ANALYTICAL DATA

ROCHESTER
PA NO. 07-110

Rochester PA# 07-110
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – TUSEDAY
INVESTIGATION DATE: 06/02/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
07-110-WR-5	193 J	1110 J	136.0	14.7	37.9 J	205 J	38800	0.65	27700	160	10700	51.4 J	29700	NR
07-110-WR-6	32.5 J	744 J	7.3	15.1	14.3 J	47.4 J	40900	0.354	13100	76.5	3580	4.11 J	2060	NR
BACKGROUND	19 J	110	0.4 UJ	7.4	10.4	11	12000	0.142	320	10 J	138	3 UJ	115	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
07-110-WR5	1.32	41.2	141	99.8	0.03	0.47	0.82	14.7	126
07-110-WR6	0.74	23.1	39.4	16.3	0.22	0.23	0.29	7.19	32.3

LEGEND

WR5 – Composite of subsamples WR5A, 5B, 5C, and 5D.
WR6 – Composite of subsamples WR6A, 6B, and 6C.
BACKGROUND – From the Maud S. Mine (07-129-SS-1).

XRF ANALYSIS RESULTS

ROCHESTER
PA NO. 07-110

MDSL AMRB/PIONEER 4/9/93

Mine Name: Rochester PA# 07-110
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
07-110-WR1-A		25752.9	2009.32	766.122	203.501 *	30201.9	57861.6		224.728 *	3611.07		142.1
07-110-WR1-B	613.619	18663.9	9017.27	2961	295.743	19566.6	52081.9		77.5284	4777.1		108.561
07-110-WR1-C	275.666	17824.2	7788.5	2815.33	198.896	7021.05	37691		69.3065	2179.7		542.276
07-110-WR1-C-DUP		18352.2	7913.88	2823.56	172.987	7564.96	37963.4		40.3542	2152.33		548.704
07-110-WR2-A		20982.8	5131.91	1759.9		38374	65379		164.008	10130.8		104.634
07-110-WR3-A		24900	26858.3	1195.5	48.1018	28542	35833.2			5296.33	39.3032	97.7337
07-110-WR3-B		22493.3	34360.4	646.915	110.382	30769	36463.5		42.4051	5307.43	57.325	113.379
07-110-WR4-A	471.203	18379.1	5468.19	392.599	118.607	38492.1	90205.1		380.978	13152.4		138.361
07-110-WR5-A	124.144	24856.2	42132.6	2683.9	103.861	14635.3	25225.8			2344.05		76.9584
07-110-WR5-B	704.505	24081.1	5512.03	2716.31	241.328	21039.2	35118		388.206	31434.4		100.026
07-110-WR5-C	433.12	22989.8	6354.32	1024.1	301.039	42262.8	51006.4		222.449	21620.6		93.8975
07-110-WR5-D	231.839	28863.9	14867.4	2354.18	186.324	10733.6	24938.2		60.0627	6757.08		186.117
07-110-WR6-A	174.505	20774.6	8156.46	4275.49		22808.7	54638		163.004	2220.8		206.812
07-110-WR6-B		25494.2	16354.2	3727.88		12456.1	42338.7		58.1293	4792.21		238.161
07-110-WR6-C		35318.6	9170.04	3877.17		25154.5	44991.1		32.8733	1415.6		53.848
07-110-WR6-C-DUP		36192.6	9270.19	3910.38		26036.2	45654.6		26.2736	1401.4		52.8267
07-110-WR-5-COMP	413.404	36957.3	16568.7	3639.96	251.626	19701.7	38769.8		298.276	21426.3		105.241
07-110-WR-6D	382 $	25753 $	2009 $	766 $	204 $	30202 $	57862 $		225 $	3611 $		142 $
07-110-WR-6-COMP	148.475	27623.2	9080.79	4484.63		20544.4	48461.6		85.7037	2265.01		163.561

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
07-110-WR1-A	84.1233		10.5058 *	6157.89	121.776	139.673 *		7059.97	154.334 *		
07-110-WR1-B	128.974		3.16442	931.36	139.74			863.933	79.5742	8.15297	
07-110-WR1-C	185.163		5.42804	1405.46	99.1413	33.4699		1275.78	131.38		10.6963
07-110-WR1-C-DUP	186.779		3.66447	1349.44	103.514	102.42		1262.08	118.568	7.18786	9.62139
07-110-WR2-A	128.111			10215.2	144.029	251.705		3889.28	147.198		17.8043
07-110-WR3-A	113.197		4.26463	882.753	128.031		25.4242	795.001	94.8164		12.4684
07-110-WR3-B	81.4896		3.03509	518.263	119.717	42.7292		438.905	127.073		9.0498
07-110-WR4-A	98.3674		20.4004	14238.1	101.795	268.598	53.834	7416.1	451.794	12.8938	16.4874
07-110-WR5-A	80.5451			1323.65	127.357	126.306		197.636	139.526	8.30746	14.5045
07-110-WR5-B	102.955	51.1198		11969.9	149.857	234.251	90.4935	1103.6	640.29	8.71967	23.6908
07-110-WR5-C	102.591		5.32827	6782.91	94.7035	210.102	43.8551	5786.95	168.381	5.41763	
07-110-WR5-D	105.841		1.8855	2133.8	152.664	142.006	14.6231	687.298	168.29		11.6235
07-110-WR6-A	95.2663		2.70892	9846.8	138.365	197.799		1514.95	257.204	6.71645	14.1041
07-110-WR6-B	139.04	24.2852		1964.21	131.584	183.59		1300.24	101.63	8.8745	
07-110-WR6-C	145.472		2.20189	2140.32	229.815	141.946		973.583	132.152	11.8756	6.38603
07-110-WR6-C-DUP	144.756		3.58226	2151.91	224.769	119.782		978.776	108.408	7.54314	9.92998
07-110-WR-5-COMP	149.784			8152.02	182.888	357.131		1460.3	401.437	7.81305	38.0266
07-110-WR-6D	84 $		11 $	61 $	122 $	140 $		7060 $	154 $	6 $	15 $
07-110-WR-6-COMP	322.969		8.37869	4611.67	207.875	96.3936		1826.37	247.979		8.28547

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

ROCHESTER
PA NO. 07-110

AIMSS SCORESHEET

SITE NAME: ROCHESTER
PA NUMBER: 07-110

GROUNDWATER PATHWAY

LINE NO.				
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		10
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	200
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	200
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	12.190
6	GW - TARGETS	WELLS - 1 MI. x 2.5		7.5
7		WELLS - 1 TO 4 MI		10
8		NEAREST WELL		5
9		TARGETS SCORE	LINES 6 + 7 + 8	22.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	54855

SURFACE WATER PATHWAY

11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	400
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	13.432
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		0
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 - 22	17
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	91338

AIR PATHWAY

25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		15
26B		DISTANCE TO POPULATION		10
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	150
27		LIKELIHOOD SCORE	LINES 25 + 26C	150
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	1.265
29	AIR - TARGETS	POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		5
31		WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 - 33	35
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	6641

DIRECT CONTACT PATHWAY

36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		0
37A		ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		10
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	200
38		LIKELIHOOD SCORE	LINES 36 + 37C	200
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	1.148
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		30
41		NEAREST RESIDENCE		5
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 - 42	35
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	8036

45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000	**1.61**

LINE NO.		SITE SAFETY		SITE NAME: ROCHESTER PA NUMBER: 07-110
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	300
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	75
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 - 7	375
9		POPULATION - 1 MILE		30
10	TARGETS	NEAREST RESIDENCE		5
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 - 11	35
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**262.50**

SUMMARY OF HISTORICAL ANALYTICAL DATA FROM OTHER SOURCES

SITE NAME: COMPROMISE MINE
DATE: 15-Aug-90

STATION	FLOW (gpm)	pH (s.u.)	SPECIFIC CONDUCTANCE (umhos/cm)	TEMP. (celcius)	COMMENTS
SHAFT	2	5.51	550	7.1	SAMPLE COLLECTED
ADIT	1	6.14	139	8.7	
WEST SEEP (BLW DUMP)	3-5	6.20	245	10.5	
EAST SEEP (BLW DUMP)	5	6.11	205	9.8	
STREAM	9	6.30	308	10	COMBINATION OF THE TWO SEEPS
PIPE (SPRING)	2.5	5.17	530	9.6	APEARS TO BE A DRINKING WATER SOURCE FOR THE RESIDENCE
SEEP (ACCESS RD)		6.02	610	8.0	

SITE NAME: DACOTAH MINE
DATE: 15-Aug-90

STATION	FLOW (gpm)	pH (s.u.)	SPECIFIC CONDUCTANCE (umhos/cm)	TEMP. (celcius)	COMMENTS
SHAFT #1	15	2.97	1700	7.7	SAMPLE COLLECTED, ALKALINITY = 0 MG/L AS CACO
ADIT #4	<1	6.72	111	9.7	
STREAM (ADJ TO #4)	50-75	6.62	90	11.2	

SITE NAME: ROCHESTER PATENT
DATE: 15-Aug-90

STATION	FLOW (gpm)	pH (s.u.)	SPECIFIC CONDUCTANCE (umhos/cm)	TEMP. (celcius)	COMMENTS
STREAM (DOWNGRADIENT)	30	4.55	780	16.1	STREAM RECIEVES DACOTAH #1 DRAINAGE 1/4 MILE SAMPLE COLLECTED AT THIS LOCATION
STREAM	30	4.53	820	15.4	

REPORT DATE: October 4, 1990

CLIENT: Abandon Mines

FIELD ID: Rochester Adit #2

LAB NO: W8562

DATE RECEIVED: 09-14-90

Hardness 236 mg/L as $CaCO_3$

Total Extractable Metals

As <0.001 mg/L

Cd 0.0906 mg/L

Cu 0.02 mg/L

Fe 0.92 mg/L

Pb 0.173 mg/L

Zn 46.5 mg/L

DATE: October 29, 1990

CLIENT: Abandoned Mines

FIELD ID: Rochester Adit #2 Dump Near Stream--08/15/90

LAB NO: S2711

DATE RECEIVED: 09-24-90

pH (1:1 slurry) 3.52 SU

Total Metals

As 127 mg/Kg

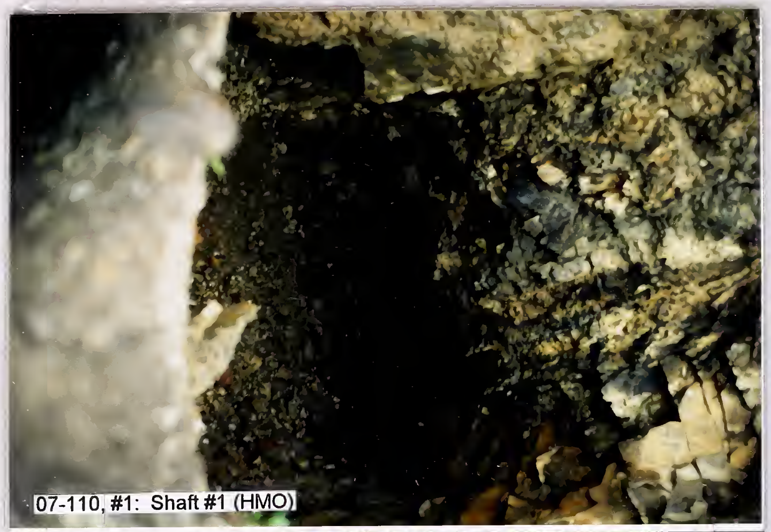
Cd <1 mg/Kg

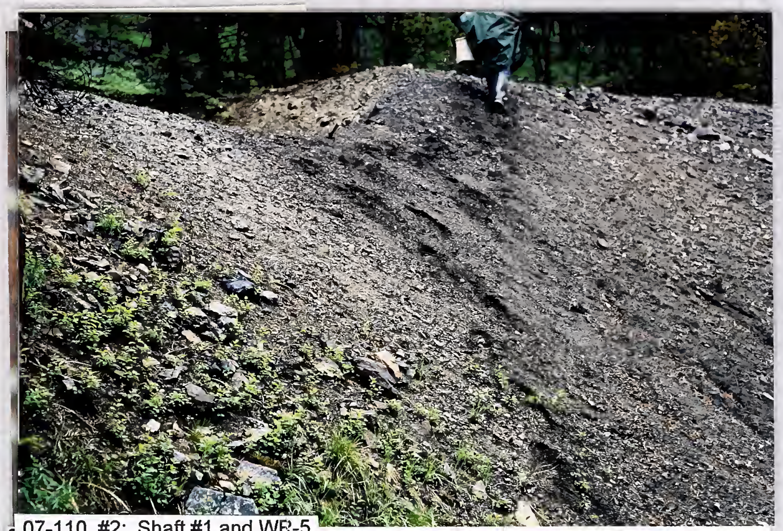
Cu 13 mg/Kg

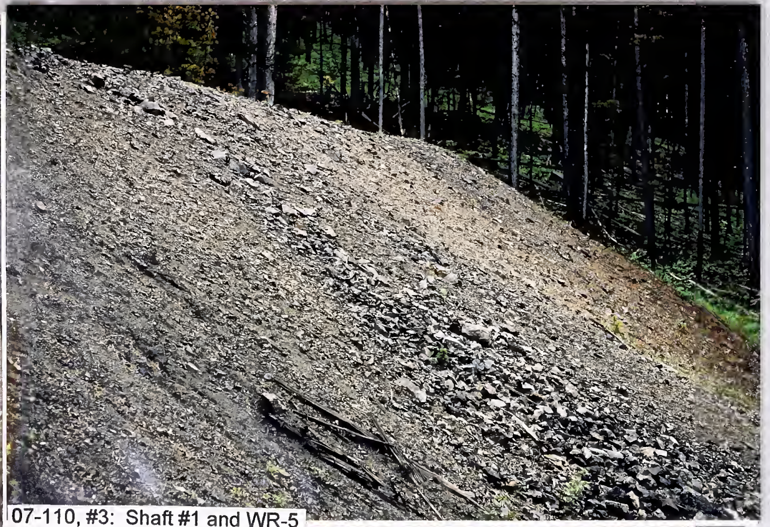
Fe 37,100 mg/Kg

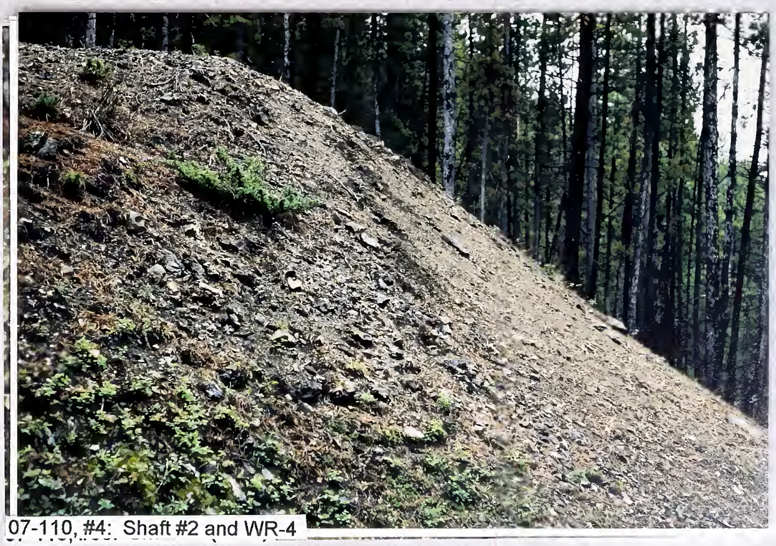
Pb 2340 mg/Kg

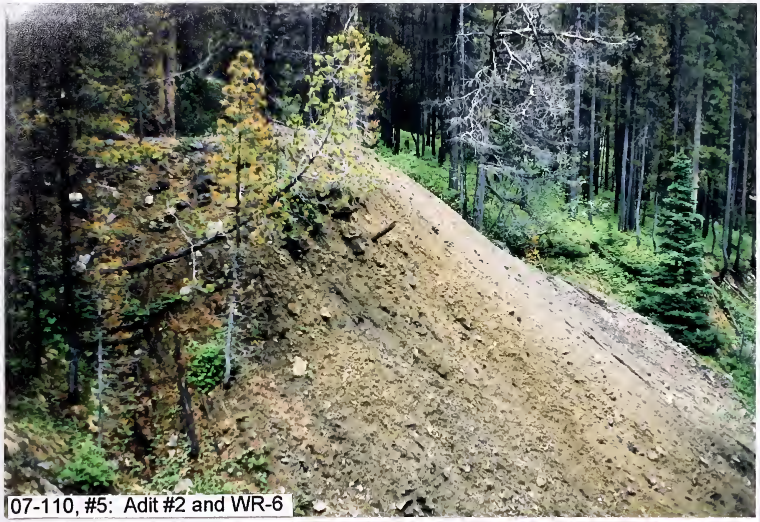
Zn 1260 mg/Kg


07-110, #1: Shaft #1 (HMO)

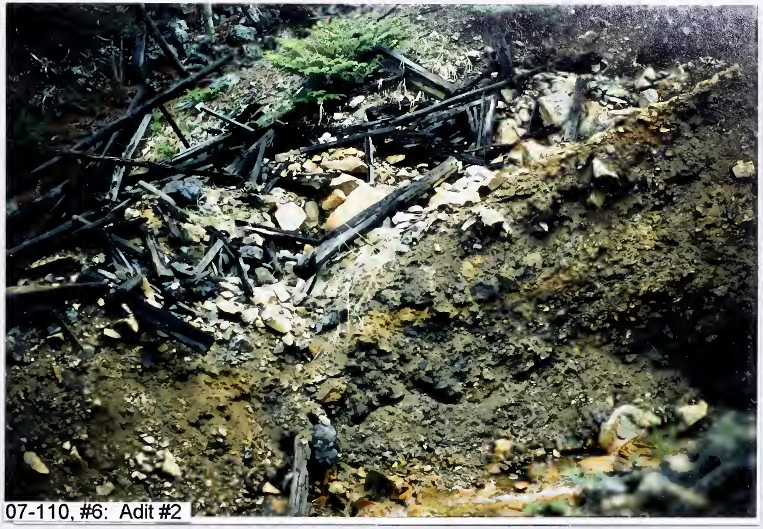

07-110, #2: Shaft #1 and WR-5


07-110, #3: Shaft #1 and WR-5

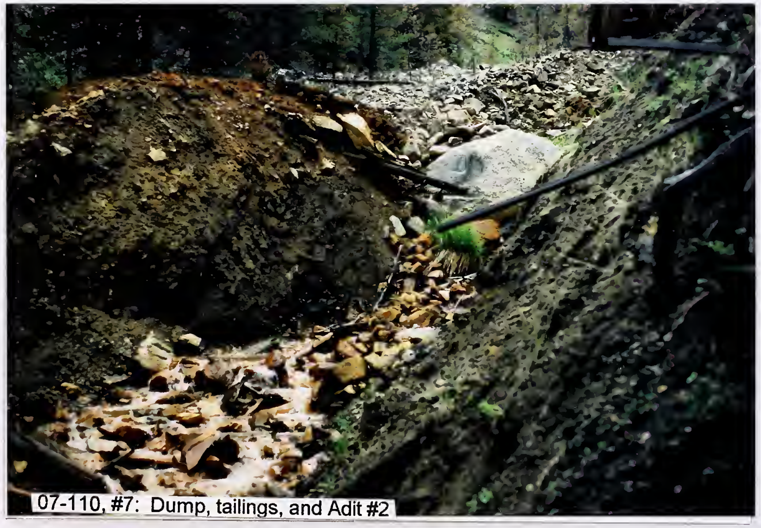

07-110, #4: Shaft #2 and WR-4



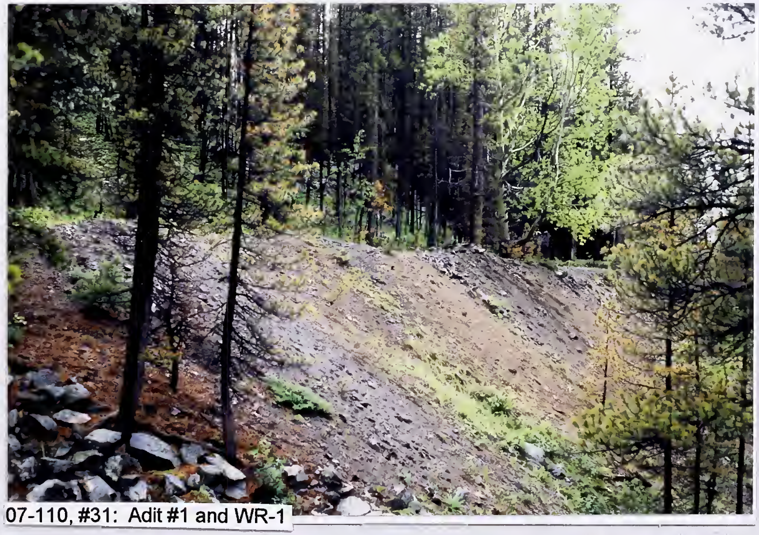
07-110, #5: Adit #2 and WR-6



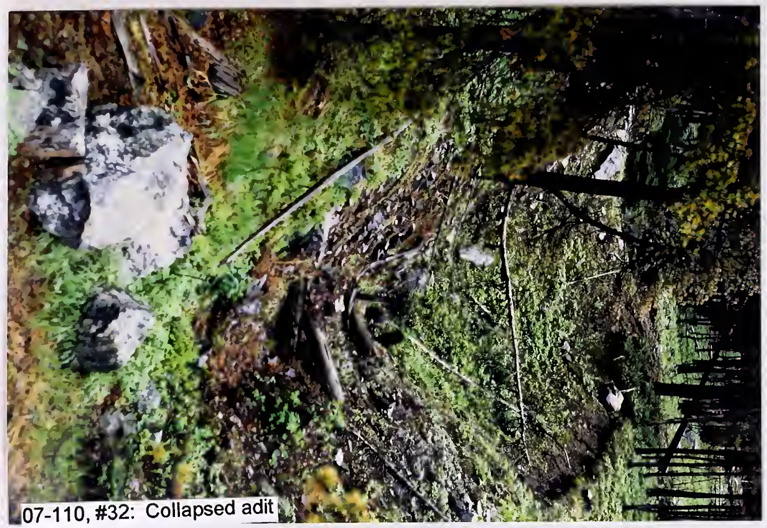
07-110, #6: Adit #2

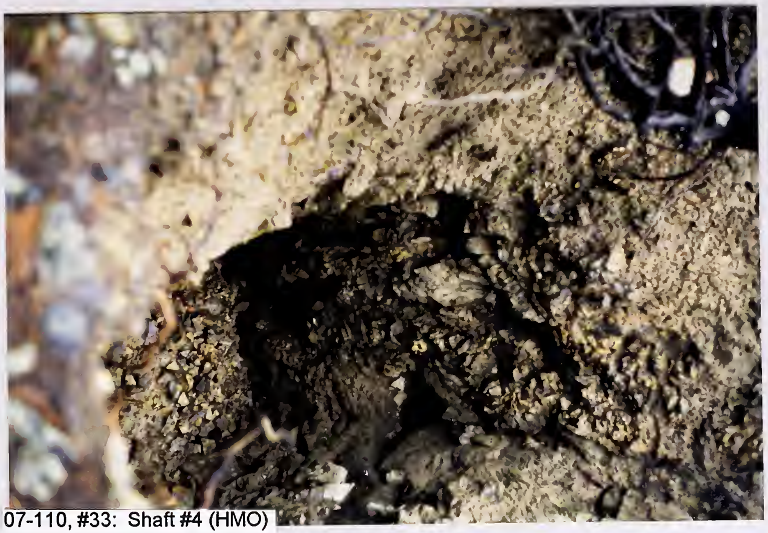


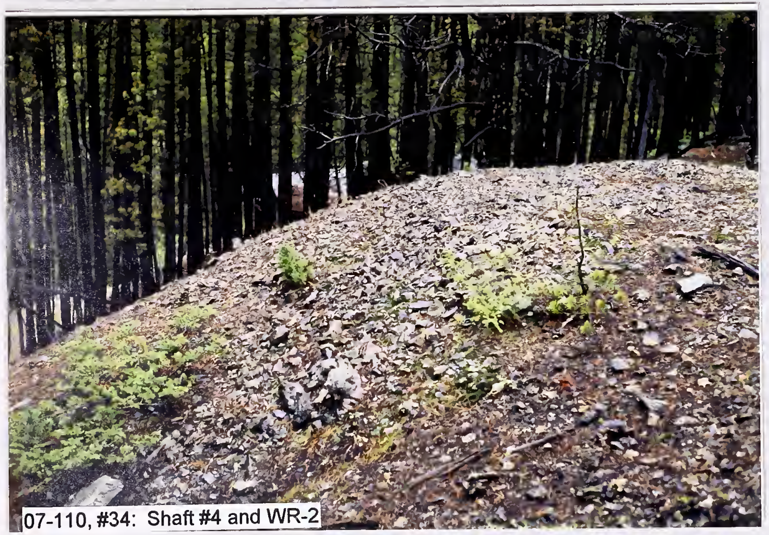
07-110, #7: Dump, tailings, and Adit #2

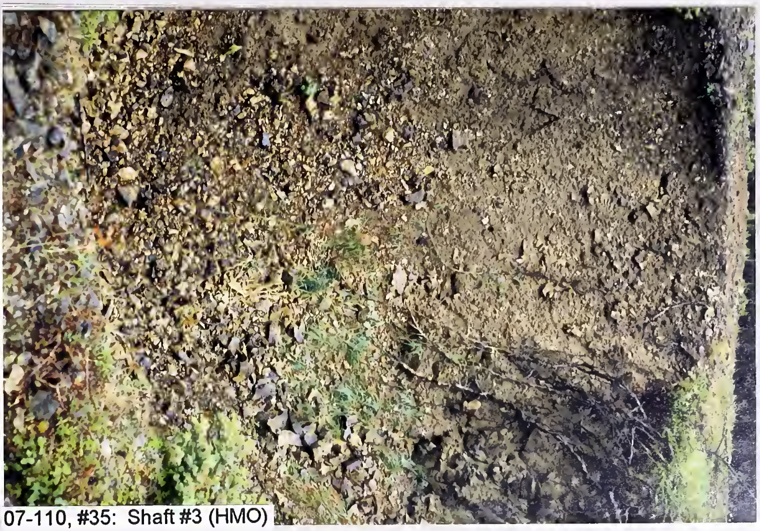


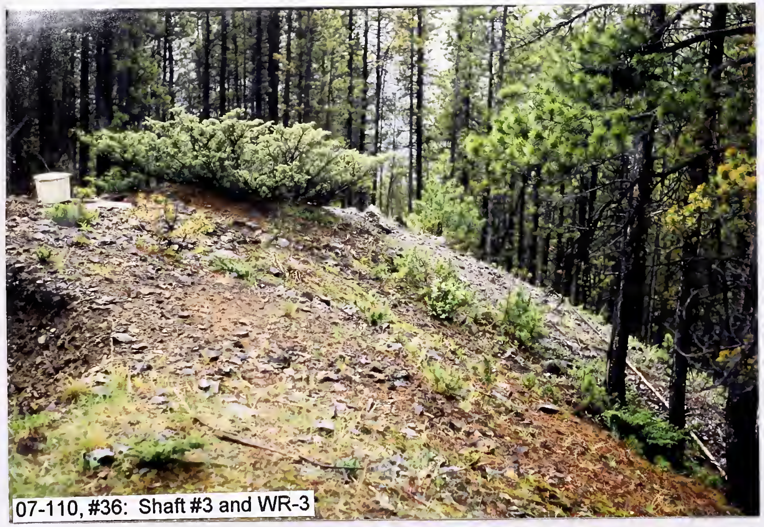
07-110, #31: Adit #1 and WR-1


07-110, #32: Collapsed adit


07-110, #33: Shaft #4 (HMO)


07-110, #34: Shaft #4 and WR-2


07-110, #35: Shaft #3 (HMO)



07-110, #36: Shaft #3 and WR-3

07-110, #37: Shaft #2 (HMO)

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: SILVER BELT PA#: 07-111

Date: July 30, 1993 Time: 0830

Field Team Leader: Babits, Pioneer

Sampling Personnel: Flammang, Lasher; Pioneer
Pierson; TD&H

Visitors: Bullock, Clark; Pioneer

Weather/Seasonality Observations: Warm (80°F); sunny; slight breeze; very cool, wet spring/summer to date.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #9: WR-1; #10: Discharging adit at WR-1; #11: Creek coming through adjacent to WR-2. Video Tape No. 1.

General Comments/Observations (not covered specifically in attached Inventory Forms): N/A

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Waste rock dumps need to have slopes reduced, lime, topsoil, and vegetation. Adit discharge is slightly low pH; Cd is elevated above Maximum Contaminant Levels and should be treated.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): SILVER BELT PA#: 07-111

Legal Description: T 14N ;R 8E ;Sec. 28 , NW1/4 SW1/4 ___1/4

County: CASCADE Mining District: NEIHART

Latitude: N 46° 56' 39" Longitude: W 110° 43' 15"

Primary Drainage Basin and Code: Belt Creek/10030105
Secondary Drainage Basin: Rock Creek

USGS Quadrangle map name(s): Neihart

Mine Type/Commodities: Hardrock/Silver, Lead, Zinc, Gold

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Private/Public
Owner, Agent, or Contact(Include address and phone when available): Larrissa P. Stewart, c/o Paul V'Dovee, 2715 South Timberline, Veradale, WA 99037; Zelda S. Rall, 2038 South 108th Street, Seattle, WA 98168-1731; Lewis and Clark National Forest.

Relationship to other mines/sites in the area/district: Appears to lie on northward extension of Broadwater vein. North section of mine very near Dacotah and immediately below Fairplay. South section of mine is on trail to Maud S.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 6900'-7180' , Slope 25°-30° ,
Aspect West

Land use: Mining___, Recreational X , Residential___, Urban___,
Agricultural___, Other(Specify)

Area of disturbed/unvegetated lands? 0.5 acres.
Dimensions:

Predominant vegetation types: Lodgepole pine forest

Access: roads - good___,poor X ,4wd___,trail X .
Other logistical considerations (proximity to other sites). Road blocked by boulders; access by foot.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 3 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). The vein lies within the Pinto diorite not far from its contact with gneiss. Northern portion of site lies adjacent to and slightly downstream of the headwaters of the perennial Rock Creek. Many mines are on the creek downgradient of the site before its confluence with Belt Creek approx. 1 1/4 miles away. Rock Creek flows southwest away from the site. The southern part of the site drains to southwest towards Rock Creek.

Mining/milling history, ore type/tenor, host rock, gangue: Tenor was approx. 80 oz. Ag, 7% Pb, 15% Zn, and 0.06 oz. Au/ton. Oxidation was relatively shallow, with secondary enrichment the important ore producer. Claim was located in 1888 and operated until 1919. It was then operated intermittently until 1927, and from 1935 to 1938 worked through the Broadwater mine. Mine adit was inaccessible by 1949. Production from 1902 to 1904 inclusive, is 62,176 tons of ore from which 585.59 oz. Au, 449,610 oz. Ag, 1,183 lbs. Cu, 663,607 lbs. Pb, and 46,970 lbs Zn were recovered.

Mine Operation?
Shafts - Yes___, No X, # ___, Comment
Adits - Yes X, No___, # 2, Comment Both caved; 1 discharge
Pits - Yes___, No X, # ___, Comment
Placers - Yes___, No X, # ___, Comment
Other - Yes___, No X, # ___, Comment

Mill Operation? Yes___, No X. If yes answer the next three questions:

Period(s) of Operation: N/A

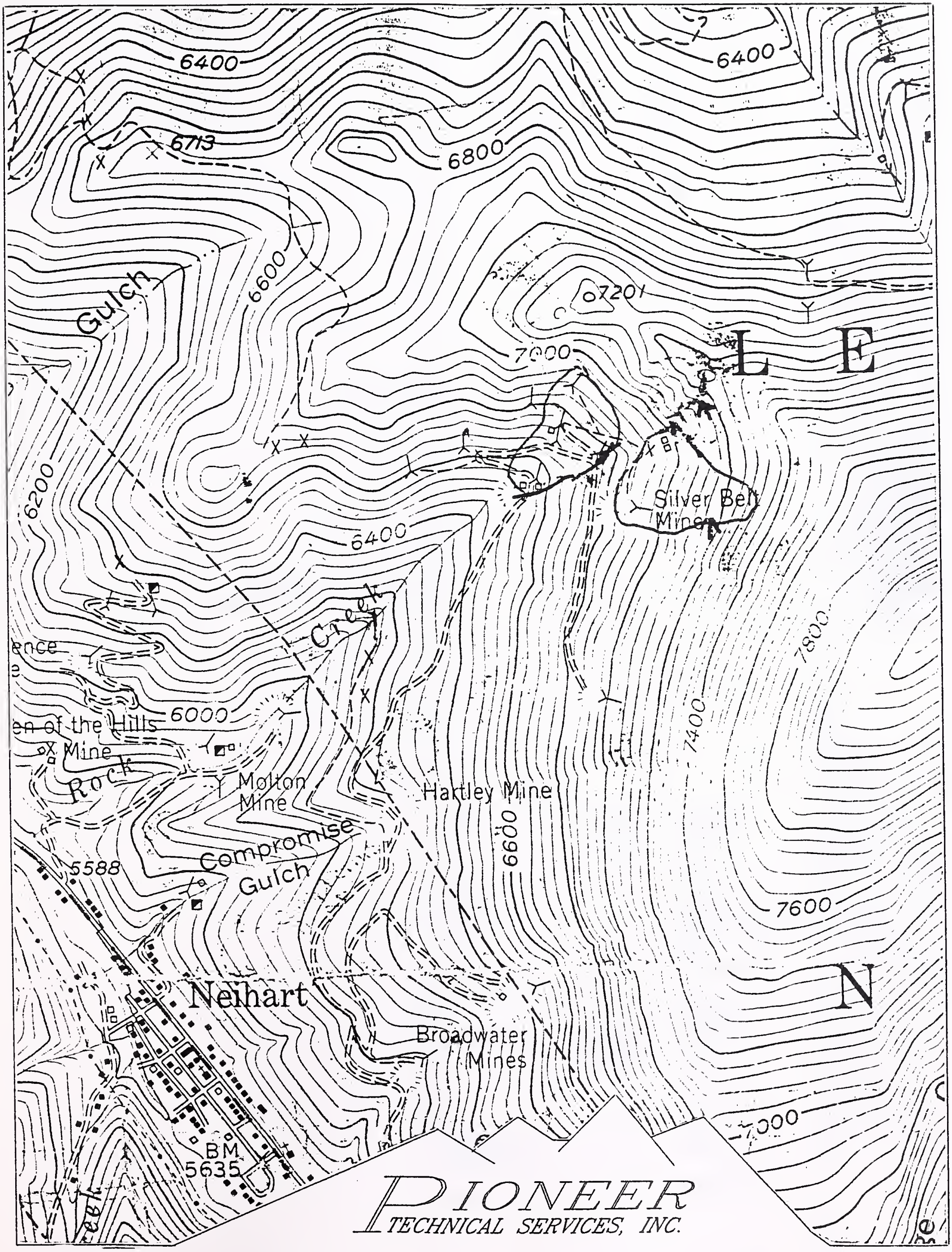
Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN^- leach (vat, heap), floatation, smelting?
N/A

Montana Bureau of Mines and Geology
Water Well Log Data

11/10/1993

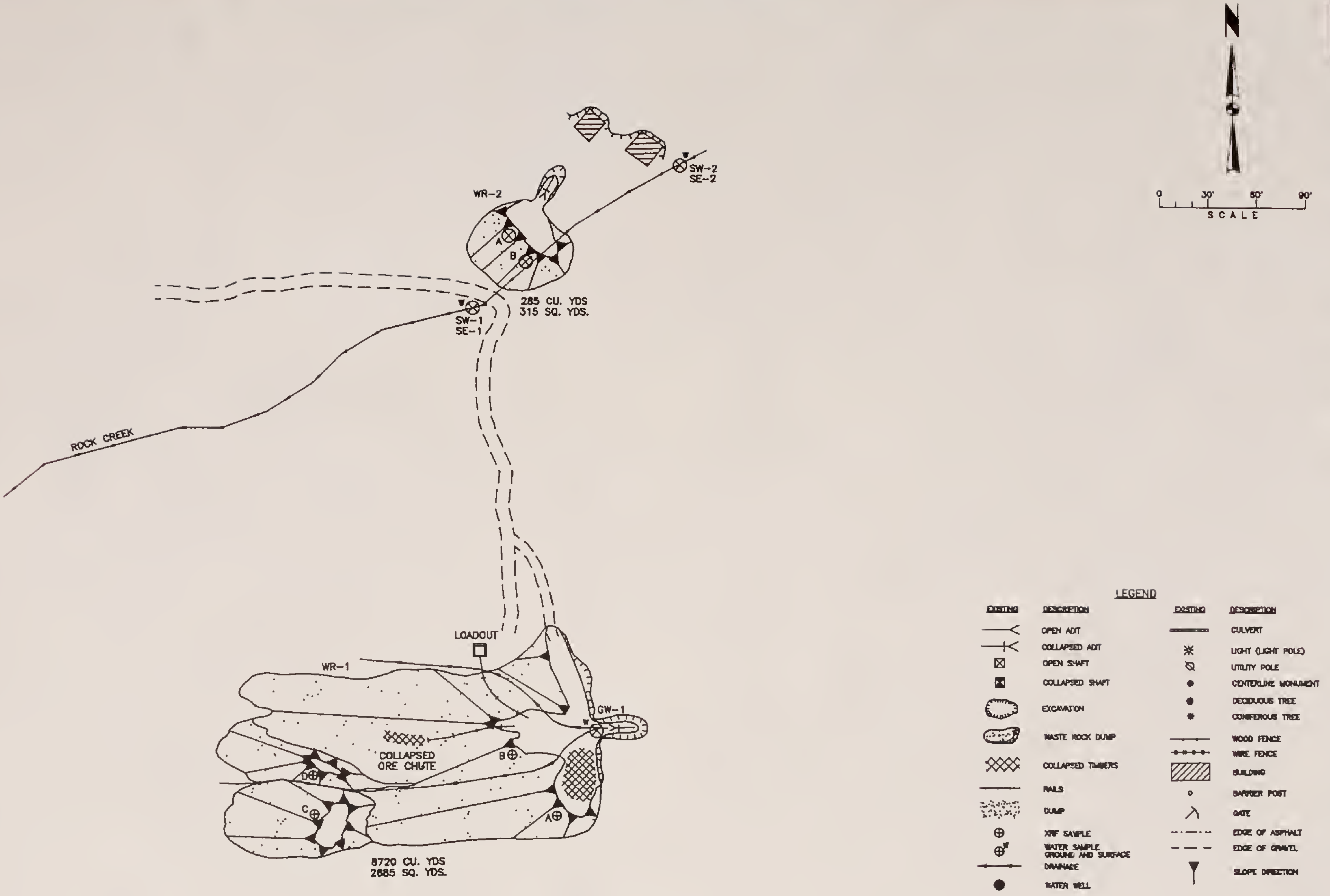
Well No.	Location	Depth	Yield	Static Water Level
M:123062	14N 08E 20 DBA	41.0	4.0	24.00
M:123061	14N 08E 20 DBA	40.0	7.0	0.00
M:25649	14N 08E 32 BDC	120.0	8.0	7.00



PIONEER TECHNICAL SERVICES, INC.

SILVER BELT, P.A. NO. 07-111

T14N, R08E, SECTION 28
SCALE: 1" = 1000'



DRAWN MWC DATE 9/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

PIONEER TECHNICAL SERVICES, INC. BUTTE, MT.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

SILVER BELT MINE PA# 07-111
NEIHART DISTRICT CASCADE COUNTY

SHEET NO.

07-111.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Babits

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	8,720	Large dump south of WR-2 and Dacotah site; southeast side	None	< 3.5 (D)	0.06	07-111-WR-1	07/30/93 1050	T-Metals, ABA
WR-1B	WR		South of loadout; center	None	4.8 (D)	0.07			
WR-1C	WR		Lower part of dump; center	None	4.0 (D)	0.05			
WR-1D	WR		Lower part of dump; south end	None	< 3.5 (D)	0.05			
WR-2A	WR	285	Small dump east of Dacotah, west of caved adit; southeast part	None	5.2 (D)	0.07	07-111-WR-2	07/30/93 1055	T-Metals, ABA
WR-2B	WR		Small dump east of Dacotah, west of caved adit; center	None	5.0 (D)	0.05			
UNK-1	Unknown	NM	Possible mill tailings approx. 500 feet downgradient of WR-1	None	N/A	N/A	N/A	N/A	XRF Analysis

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 07-111-WR-1 is composite of WR-1A through -1D. 07-111-WR-2 is composite of WR-2A and -2B. NM = Not Measured.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes X , No ___, Number: 1 Identification: Adit #1

Filled shafts: Yes ___, No X , Number: ___ Identification: ___

Seeps/Springs: Yes X , No ___, Number: 2 Identification: Very small seep just above cabin on WR-2; large seep from base of WR-2.

Groundwater wells within 4 miles?: Yes X , No ___;
Number of well logs: 13

Distance to nearest well used for drinking? 1 1/4 miles

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible X , Unlikely____.
Metal values are high in waste rock dumps; however, pH of adit discharg was normal.

Other observations/notes: Water from Adit #1 flows across WR-1 in four separate flows. Water from the adit flowed quite a distance across the surface before disappearing; no confluence with Rock Creek could be identified.

GROUNDWATER INVENTORY FORM

SAMPLERS: Babits, Flammang

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
GW-1	AD	Water from Adit #1	36.7 gpm (M)	6.63	580	NM	NM	4	N/A	07-111-GW-1	07/30/93 1000	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): NM = Not Measured. No downgradient sample was taken of adit discharge due to flow disappearing before entering Rock Creek, no identifiable PPE.

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X , No ___, Name(s): Rock Creek and Adit #1 discharge

Dry streambeds: Yes ____, No X , Name(s): ____

Other surface water: Yes ____, No X , Name(s)/Description: ____

Waste materials within any floodplain: Yes ____, No X Source ID(s): ____

Approximate Flood frequency? X 1 yr, ___ 10 yr, ___ 100 yr

Estimated seasonal flow of stream(s) (cfs)? 0.226 during investigation
High Flow: 1.0 cfs , Average Flow: 0.2 cfs

Distance between waste source(s) and nearest surface water body (ft)? 0 feet between base of WR-2 and stream. Adit #1 discharge flows over WR-1 in four places.

Surface water draining onto or through waste sources: Yes X , No ____,
Describe: Adit #1 discharge flows over and down dump.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Residential, wetlands

Observed erosional/sedimentation/stream turbidity problems? Yes X , No ____, Distance downstream (ft)? 1000+ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
Adit #1 discharge flows over WR-1; discolored waste rock until the discharge hits the next mine above road.

SURFACE WATER INVENTORY FORM

SAMPLERS: Babits, Flammang

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	100' below WR-2 on Rock Creek	6.68	150	225.4	N/A	5	0.226 cfs (M)	07-111-SW-1	07/30/93 1130	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-1	SE	100' below WR-2 on Rock Creek	N/A	N/A	N/A	N/A	N/A	N/A	07-111-SE-1	07/30/93 1130	T-Metals
SW-2	SW	Across from cabins above WR-2	6.8	90	334.3	9.9	23	0.022 cfs (M)	07-111-SW-2	07/30/93 1215	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-2	SE	Across from cabins above WR-2	N/A	N/A	N/A	N/A	N/A	N/A	07-111-SE-2	07/30/93 1215	T-Metals

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? None

Wetlands present: Yes___, No X, Describe:

Carbonate rocks/soils: Yes___, No X, Describe:

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X ; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 1 mile

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Babits, Flammang, Lasher

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH /MODERATE/LOW/NONE)
Adit #1	FEOX	N/A	N/A	N/A	N/A	N/A
WR-1	SO4, pH	Moist	24,165	24,165	Yes	Low/Moderate
WR-2	SO4	Moist	2,835	2,835	Yes	Low/Moderate

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No X , Describe:________

Population within 1 mile: 1-10___; 10-30___; 30-100 X ; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments________

Evidence of recreational use on site: Yes___, No X , Describe:________

Accessibility - Fences, warning signs, closed roads? Unrestricted

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No X , Comment________
Wilderness Area - Yes___, No X , Comment________
T&E Species Habitat - Yes___, No X , Comment________
Bat Habitat - Yes___, No X , Comment________

Primary Drainage___; Secondary Drainage X ; No Information___:

Riparian Habitat Quality - High___, Medium X , Low___
Wetlands Frontage - High___, Medium___, Low X
Fisheries Habitat and Species Classification - Not Rated
Sport Fishery Classification - Not Rated

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes___, No X , Number____, types and locations:________

Hazardous structures: Yes X , No___, Number 4 , types and locations: Two cabins collapsing above WR-2; one loadout structure on WR-1 collapsing; one collapsing wood structure.

Unstable highwalls, pits, trenches, slopes: Yes___, No X , Number____, types and locations:________

Unstable waste piles, impoundments, undercut banks: Yes X , No____, Number 2 , types and locations: WR-1 and -2 are steep, unvegetated, and at angle of repose.

Fire and/or Explosion hazards: Yes___, No X , Explain:________

Bibliography

MBMG, Geology and Ore Deposits of the Neihart Mining District, Cascade County, Montana, Memoir No. 13, Written by Paul A. Schafer, July 1935, p. 45.

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for the Silver Belt site, Prepared by Chen-Northern, September 16, 1989.

USBM, Mines and Mineral Deposits (Except Fuels), Cascade County, Montana, Information Circular 7589, Written by Almon F. Robertson, Completed in April 1950, pp. 34-35.

USGS, Topographic Map, Neihart, Montana, 7 1/2 minute Quadrangle, 1961.

LABORATORY ANALYTICAL DATA

SILVER BELT
PA NO. 07-111

Silver Belt PA# 07−111
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER − BABITS
INVESTIGATION DATE: 07/30/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
07−111−SE−1	144 J	114 J	53.2 J	19.3	7.6 J	187 J	31900	0.143 JX	13200	27	2810	13 J	8060 J	NR
07−111−SE−2	28 J	258 J	10.4 J	13.3	29.8 J	50.9 J	28200	0.104 JX	1010	26	225	17 U	1650 J	NR
07−111−WR−1	581 J	105 J	35.3 J	13.1	29.8 J	116 J	59300	0.39 JX	3080	29	4180	24 J	9500 J	NR
07−111−WR−2	500 J	85.6 J	83.8 J	6	5.1 J	135 J	57900	0.645 JX	2620	5	5350	28 J	18300 J	NR
BACKGROUND	19 J	110	0.4 UJ	7.4	10.4	11	12000	0.142	320	10 J	138	3 UJ	115	NR

U − Not Detected; J − Estimated Quantity; X − Outlier for Accuracy or Precision; NR − Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
07−111−WR−1	1.56	48.7	5.19	−43.5	0.89	0.21	0.46	6.56	−1.37
07−111−WR−2	0.55	17.2	2.45	−14.7	0.27	0.02	0.26	0.62	1.83

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
07−111−GW−1	4.99 J	3.87	37.9	19.7	6.83 U	28.2	1520	0.11 J	14100	48.6	231	30.7 U	8930	68
07−111−SW−1	2.1 J	19.8	13	9.7 U	6.83 U	10.1	22.7	0.14 J	462	12.7 U	3.93	30.7 U	3800	52.5
07−111−SW−2	2.76 J	34.1	2.57 U	9.7 U	6.83 U	1.55 U	32.8	0.038 U	11.4	12.7 U	1.54	30.7 U	86.8	34

U − Not Detected; J − Estimated Quantity; X − Outlier for Accuracy or Precision; NR − Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2−N	CYANIDE
07−111−GW−1	176	< 5.0	109	0.05	NR
07−111−SW−1	97	< 5.0	46	< 0.05	NR
07−111−SW−2	76	< 5.0	6	< 0.05	NR

LEGEND

SE1 − 100 feet below waste rock dump 2 on Rock Creek.
SE2 − Across from cabins above waste rock dump 2.
WR1 − Composite of subsamples WR1A, 1B, 1C, and 1D.
WR2 − Composite of subsamples WR2A and 2B.
BACKGROUND − From Maud S. Mine (07−129−SS−1).

SW1 − Same as SE1.
SW2 − Same as SE2.

XRF ANALYSIS RESULTS

SILVER BELT
PA NO. 07-110

Mine Name: Silver Belt PA# 07-111
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
07-111-UNK1		26762.8	11045	2694.27		771.247 *	80978.3		197.118 *	3867.64		103.522
07-111-WR1-A		18453.9	4210.95	3432.35		1861.25	104745		164.038 *	1014.67	669.764	375.149
07-111-WR1-B	691.992 *	17333	19463.4	2803.59	149.482 *	12417	69401.2		175.066 *	5582.52		187.434
07-111-WR1-C		24721	19621.4	5671.24		407.7 *	39152.4			2065.73		34.5698
07-111-WR1-D		22734.3	14283	3967.33	158.93 *	952.265 *	77120.2		80.4422 *	1190.77	523.699	277.191
07-111-WR2-A		26222.9	2458.21	2229.75		11900.4	96620.7		220.216 *	8339.23		41.2234 *
07-111-WR2-B		22826.4	4592.48	4213.73			78983.7		74.8707 *	2261	367.278 *	123.318
07-111-WR-1-COMP		23590.2	16189.7			3715.95	63666.6		84.4233 *	2462.17	194.292 *	181.262
07-111-WR-2-COMP		27737.1	2756.06	4040.03		1999.98	87634.4			2721.67		61.8582

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
07-111-UNK1	162.112		31.8524	18049.1	140.184	310.498 *		300.251	539.178		
07-111-WR1-A	154.275			2548.19	155.495	285.796 *		861.526	303.452 *	13.5037 *	11.3495 *
07-111-WR1-B	165.955			5840.85	173.5			272.019	283.406 *		18.5584 *
07-111-WR1-C	100.117			4136.9	180.996			140.597	478.964		
07-111-WR1-D	129.225		9.6437 *	2184.72	155.631			392.366	278.61 *		
07-111-WR2-A	48.4565	65.4194 *		7360.75	207.877						
07-111-WR2-B	103.928			3777.99	188.62			301.655	197.931 *		
07-111-WR-1-COMP	129.808			3303.96	172.326			340.374	301.955 *		
07-111-WR-2-COMP	101.365			5199.42	212.147	174.177 *		346.182	256.408 *		

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

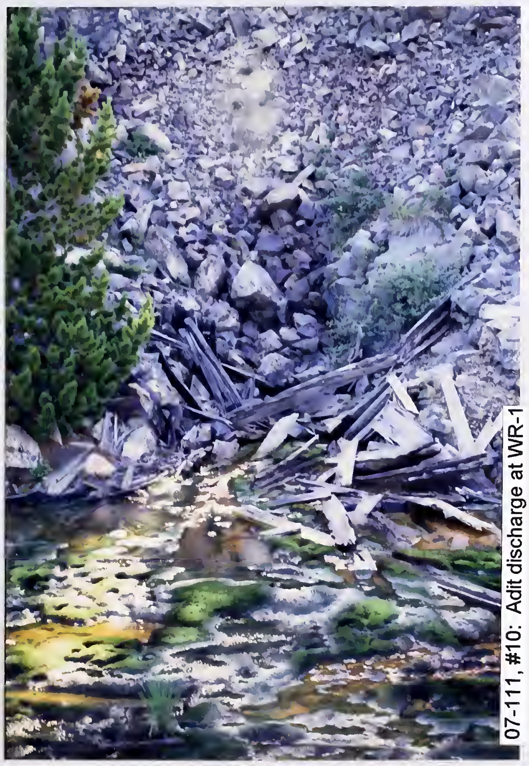
SILVER BELT
PA NO. 07-111

AIMSS SCORESHEET

SITE NAME: SILVER BELT
PA NUMBER: 07-111

LINE NO.				
		GROUNDWATER PATHWAY		
1		OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A	GW - LIKELIHOOD OF RELEASE	CONTAINMENT		20
3B		GW DEPTH		10
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	200
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	200
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	25.806
6		WELLS - 1 MI. x 2.5		7.5
7	GW - TARGETS	WELLS - 1 TO 4 MI		10
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	17.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	90321
		SURFACE WATER PATHWAY		
11		OBSERVED RELEASE		300
12	SW - LIKELIHOOD OF RELEASE	EXCEEDENCES		100
13A		CONTAINMENT		20
13B		DISTANCE TO SW		10
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	200
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	600
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	28.365
16		DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		1
18		WETLANDS		10
19	SW - TARGETS	FISHERY		0
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 - 22	18
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	306342
		AIR PATHWAY		
25		OBSERVED RELEASE		0
26A	AIR - LIKELIHOOD OF RELEASE	CONTAINMENT		15
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	75
27		LIKELIHOOD SCORE	LINES 25 + 26C	75
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.582
29		POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		0
31	AIR - TARGETS	WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 - 33	40
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	1746
		DIRECT CONTACT PATHWAY		
36		OBSERVED EXPOSURE		0
37A	LIKELIHOOD OF EXPOSURE	ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	100
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.529
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		30
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 - 42	30
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	1587
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**4.00**

			SITE NAME:	SILVER BELT
			PA NUMBER:	07-111
LINE NO.		**SITE SAFETY**		
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	160
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 - 7	160
9		POPULATION - 1 MILE		30
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 - 11	30
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**96.00**


07-111, #10: Adit discharge at WR-1

07-111,#9: WR-1

07-111, #11: Creek adjacent to WR-2

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: FAIRPLAY PA#: 07-112

Date: July 30, 1993 Time: 1000

Field Team Leader: Babits, Pioneer

Sampling Personnel: Flammang, Lasher; Pioneer
Pierson; TD&H

Visitors: Bullock, Clark; Pioneer

Weather/Seasonality Observations: Clear; warm (65°-75°F); breezy (10 mph); cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #12: Adit discharge at WR-1; #13: WR-1 from base. Video Tape No. 1.

General Comments/Observations (not covered specifically in attached Inventory Forms): N/A

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Waste rock could be reprocessed for lead. Adit discharge exceeds primary Maximum Contaminant Levels for cadmium and should be treated.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): FAIRPLAY PA#: 07-112

Legal Description: T 14N ;R 8E ;Sec. 28 , SW1/4 NW1/4 ___1/4

County: CASCADE Mining District: NEIHART

Latitude: N 46° 56' 44" Longitude: W 110° 43' 10"

Primary Drainage Basin and Code: Belt Creek/10030105
Secondary Drainage Basin: Rock Creek

USGS Quadrangle map name(s): Neihart

Mine Type/Commodities: Hardrock/Silver, Lead, Zinc, Gold

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Private/Public
Owner, Agent, or Contact(Include address and phone when available): Jack L. McLeod, 1905 Holmes Avenue, Butte, MT 59701; Lewis and Clark National Forest.

Relationship to other mines/sites in the area/district: Same vein as the Bon Ton mine.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 7200', Slope 29°, Aspect West

Land use: Mining___, Recreational X , Residential___, Urban___, Agricultural___, Other(Specify)

Area of disturbed/unvegetated lands? 0.1 acres.
Dimensions: WR-1 (57'x120')

Predominant vegetation types: Lodgepole pine, grasses

Access: roads - good___,poor X ,4wd___,trail___.
Other logistical considerations (proximity to other sites). Near Silver Belt and Dacotah mines; must walk from above Dacotah.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 3 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Unnamed tributary has headwaters south of the site and flows east to west. Site is underlain by limestone and granite porphyry.

Mining/milling history, ore type/tenor, host rock, gangue: History from 1880's to 1946; produced 940 dry tons of ore. Smelter returns showed ore averaged 8% lb., 25% Zn, and 5 oz. Ag/ton. Ore occurs in replacemnts along the contact of thin-bedded Madison Limestone and granite porphyry. Ore minerals are mainly galena and sphalerite with pyrite and a small amount of chalcopyrite. Calcite and quartz are the principal gangue minerals.

Mine Operation?

Shafts - Yes___, No X , # ____, Comment

Adits - Yes X , No___, # 1 , Comment Collapsed; discharge

Pits - Yes___, No X , # ____, Comment

Placers - Yes___, No X , # ____, Comment

Other - Yes X , No___, # 4 , Comment Very small holes

Mill Operation? Yes____, No X . If yes answer the next three questions:

Period(s) of Operation: N/A

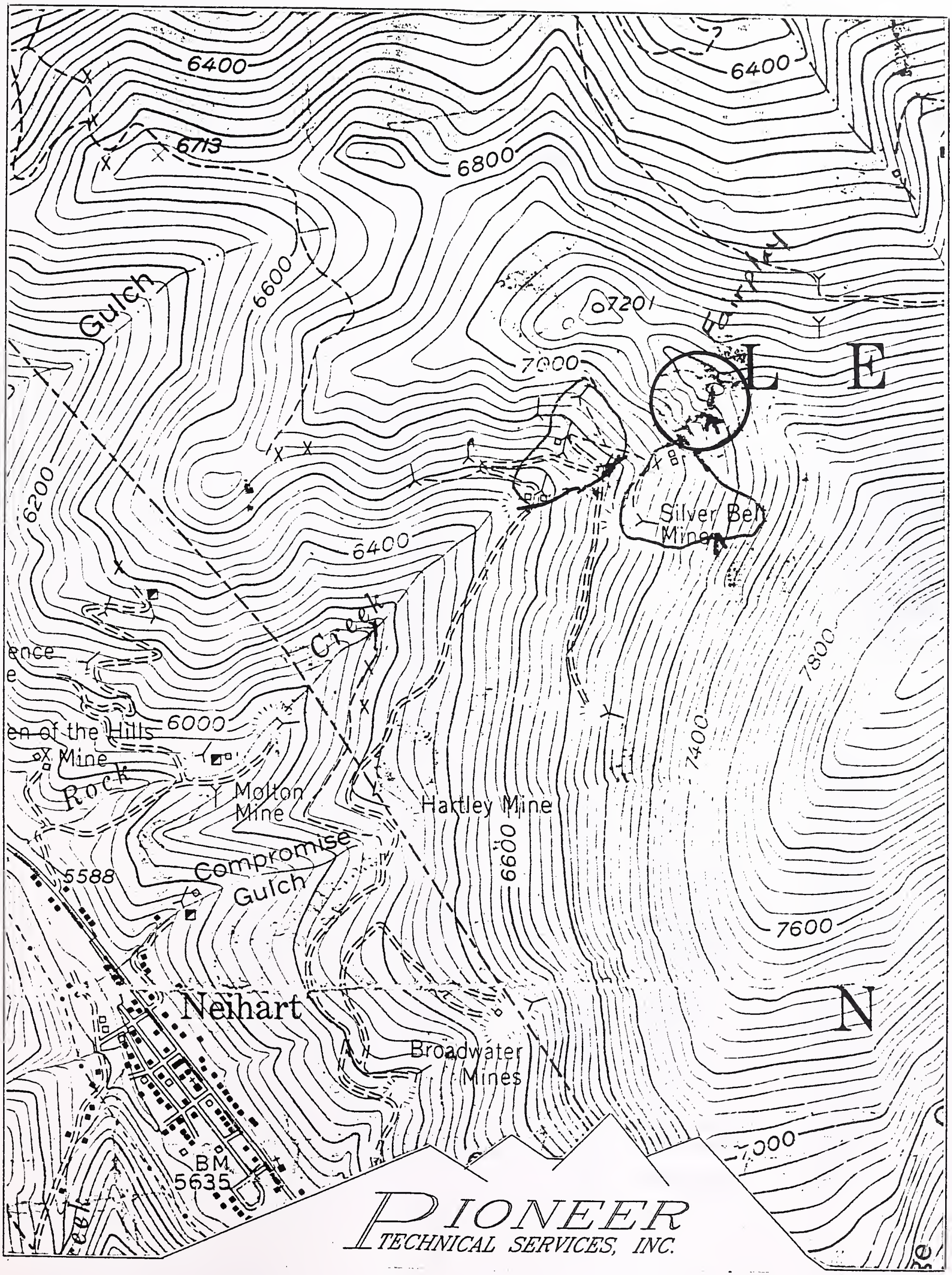
Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
N/A

Montana Bureau of Mines and Geology
Water Well Log Data

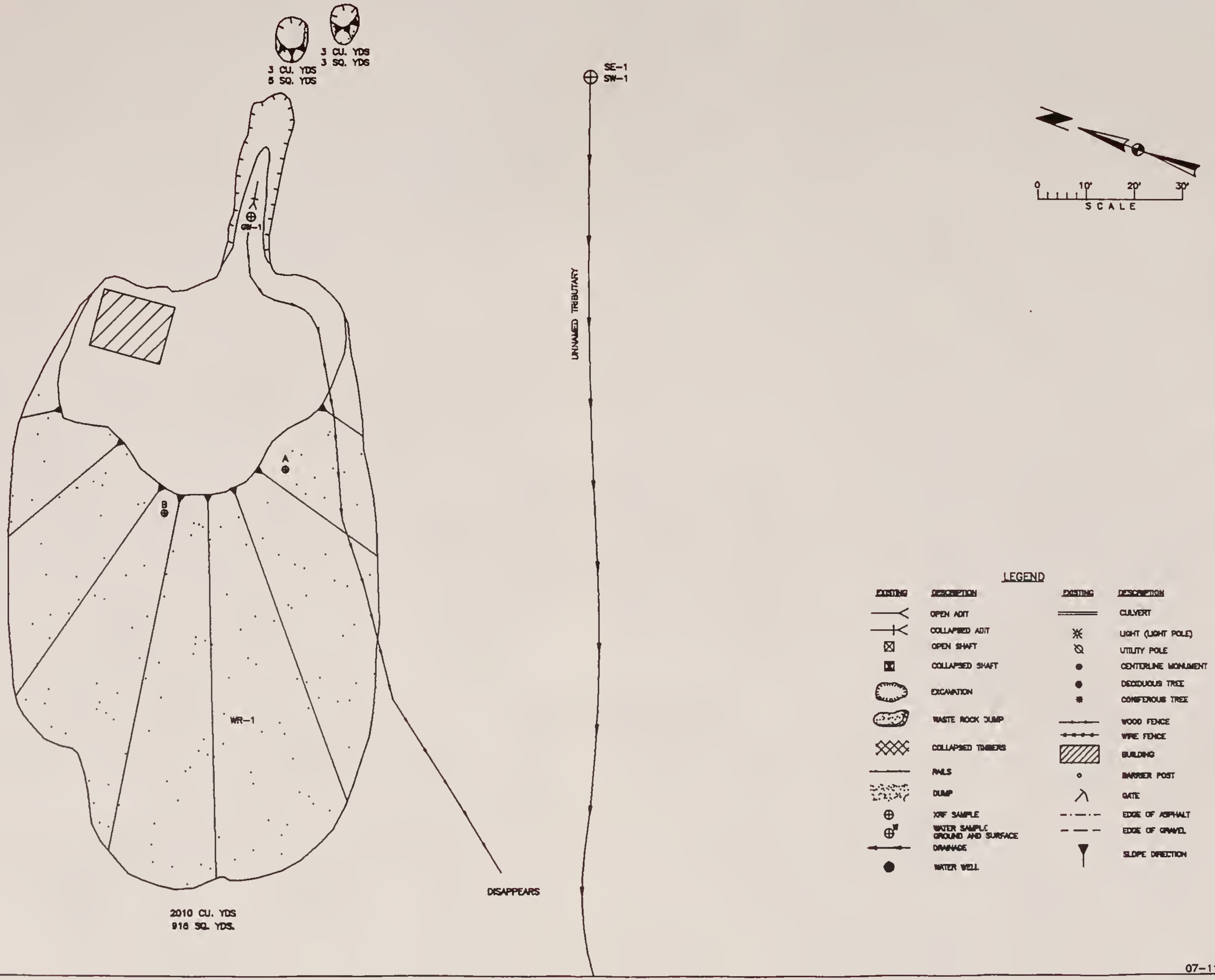
11/10/1993

Well No.	Location	Depth	Yield	Static Water Level
M:123062	14N 08E 20 DBA	41.0	4.0	24.00
M:123061	14N 08E 20 DBA	40.0	7.0	0.00
M:25649	14N 08E 32 BDC	120.0	8.0	7.00



FAIRPLAY, P.A. NO. 07-112

T14N, R08E, SECTION 28
SCALE: 1" = 1000'



07-112.DWG

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

FAIRPLAY PA# 07-112
NEIHART DISTRICT CASCADE COUNTY

PIONEER

DRAWN MWC DATE 9/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

TDH

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS-BOZEMAN-KALISPELL MONTANA
SPOKANE WASHINGTON

SHEET NO.

SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Babits

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	2,010	South side of dump	None	< 3.5 (D)	0.07	07-112-WR-1	07/30/93 1115	T-Metals, ABA
WR-1B	WR		North side of dump	None	6.2 (D)	0.07			

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 07-112-WR-1 is composite of 2/3 of WR-1A and 1/3 of WR-1B. See Maud S. Mine (07-129) for background soil.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes X , No___, Number: 1 Identification: At WR-1

Filled shafts: Yes___, No X , Number:___ Identification:___

Seeps/Springs: Yes X , No___, Number: 1 Identification: Below WR-1 in creek.

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 13

Distance to nearest well used for drinking? Approx. 1 mile

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible X , Unlikely____.
Uncontained source; high metal values in dumps.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: Babits, Flammang

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
GW-1	AD	Discharge from Adit #1	2.39 gpm (M)	6.09	240	231.4	6.8	9	N/A	07-112-GW-1	07/30/93 1245	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X, No ___, Name(s): Unnamed tributary to Rock Creek

Dry streambeds: Yes ___, No X, Name(s):

Other surface water: Yes ___, No X, Name(s)/Description:

Waste materials within any floodplain: Yes ___, No X Source ID(s):

Approximate Flood frequency? X 1 yr, ___10 yr, ___100 yr

Estimated seasonal flow of stream(s) (cfs)? 1.2 gpm during sampling
High Flow: 5.0 gpm, Average Flow: 1.0 gpm

Distance between waste source(s) and nearest surface water body (ft)? 40 feet from WR-1 to unnamed tributary.

Surface water draining onto or through waste sources: Yes X, No ___, Describe: Adit discharge flowing through WR-1.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?) Irrigation, fishery, wetland; possible agricultural, residential, and recreation on Belt Creek.

Observed erosional/sedimentation/stream turbidity problems? Yes X, No ___, Distance downstream (ft)? 1000 Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): Iron-staining

SURFACE WATER INVENTORY FORM

SAMPLERS: Babits, Flammang

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	Across from dump where stream first appears	6.78	120	285.3	6.9	130	1.2 gpm (M)	07-112-SW-1	07/30/93 1310	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-1	SE	Across from dump where stream first appears	N/A	N/A	N/A	N/A	N/A	N/A	07-112-SE-1	07/30/93 1310	T-Metals
SW-2	BLNK	QA/QC Blank	N/A	N/A	N/A	N/A	N/A	N/A	07-112-SW-2	07/30/93 1300	T-Metals, CN-
SW-2	SW	Downgradient of site across from cabins	6.8	90	334.3	9.9	23	0.022 cfs (M)	07-111-SW-2	07/30/93 1215	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-2	SE	Downgradient of site across from cabins	N/A	N/A	N/A	N/A	N/A	N/A	07-111-SE-2	07/30/93 1215	T-Metals

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): Downgradient surface water for this site is 07-111-SW-2 and 07-111-SE-2. No sediments taken at 500' and 1000'; other surface water samples taken for Dacotah (07-121) cover these.

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? None

Wetlands present: Yes X , No ___, Describe: Creekside at unnamed tributary

Carbonate rocks/soils: Yes X , No ___, Describe: Site is reported to be underlain by limestone.

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X ; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? Approx. 1 mile

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Babits, Flammang

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH /MODERATE/LOW/NONE)
WR-1	SO3; pH	Moist	8,235	8,235	Yes	Low
Adit #1	FEOX	N/A	N/A	N/A	N/A	N/A

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No X ,
Describe:________________

Population within 1 mile: 1-10___; 10-30___; 30-100 X ; 100-300___;
300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments________________

Evidence of recreational use on site: Yes___, No X , Describe:________

Accessibility - Fences, warning signs, closed roads? Must hike to site, but no access restrictions.

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No X , Comment________
Wilderness Area - Yes___, No X , Comment________
T&E Species Habitat - Yes___, No X , Comment________
Bat Habitat - Yes___, No X , Comment________

Primary Drainage___; Secondary Drainage X ; No Information___:

Riparian Habitat Quality - High___, Medium X , Low___
Wetlands Frontage - High___, Medium___, Low X
Fisheries Habitat and Species Classification - Not Rated
Sport Fishery Classification - Not Rated

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes___, No X , Number____, types and locations:___

Hazardous structures: Yes___, No X , Number____, types and locations:_

Unstable highwalls, pits, trenches, slopes: Yes___, No X , Number____,
types and locations:________________

Unstable waste piles, impoundments, undercut banks: Yes X , No____,
Number 1 , types and locations: Waste rock is unvegetated, steep, and at angle of repose.

Fire and/or Explosion hazards: Yes___, No X , Explain:________________

Bibliography

MBMG, Mineral Information File 90.0, Fairplay Mine, Cascade County.

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for the Fairplay site, Prepared by Chen-Northern, September 16, 1989.

USBM, Mines and Mineral Deposits (Except Fuels), Cascade County, Montana, Information Circular 7589, Written by Almon F. Robertson, Completed in April, 1950, pp. 65-66.

USGS, Topographic Map, Neihart, Montana, 7 1/2 minute Quadrangle, 1961.

LABORATORY ANALYTICAL DATA

FAIRPLAY
PA NO. 07-112

MDSL AMRB/PIONEER 4/9/93

Fairplay PA# 07-112
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – BABITS
INVESTIGATION DATE: 07/30/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
07-112-SE-1	21 J	230 J	3.5 J	22.6	48.9 J	36.6 J	43600	0.026 JX	2680	26	455	7 U	763 J	NR
07-111-SE-2	28 J	258 J	10.4 J	13.3	29.8 J	50.9 J	28200	0.104 JX	1010	26	225	17 U	1650 J	NR
07-112-WR-1	257 J	44.2 J	22.9 J	3.5	2.5 J	287 J	40500	1.02 JX	1140	4	18400	20 J	6260 J	NR
BACKGROUND	19 J	110	0.4 UJ	7.4	10.4	11	12000	0.142	320	10 J	138	3 UJ	115	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
07-112-WR-1	2.48	77.5	47.4	–30.1	0.44	0.98	1.06	30.6	16.8

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
07-112-GW-1	15.2 J	9.7	22.9	11.5	6.83 U	58.9	8010	0.038 U	2280	12.7 U	92.7	30.7 U	5350	74.1
07-112-SW-1	1.89 J	33.7	2.57 U	9.7 U	6.83 U	1.55 U	37.8	0.066 J	7.9	12.7 U	0.88	30.7 U	20.5	33.9
07-112-SW-2	2.61 J	2.01 U	2.57 U	9.7 U	6.83 U	1.55 U	11.8 U	0.1 J	4.08 U	12.7 U	0.72 UJ	30.7 U	7.57 U	0.1
07-111-SW-2	2.76 J	34.1	2.57 U	9.7 U	6.83 U	1.55 U	32.8	0.038 U	11.4	12.7 U	1.54	30.7 U	86.8	34

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
07-112-GW-1	158	< 5.0	88	< 0.05	NR
07-112-SW-1	67	< 5.0	5	< 0.05	NR
07-112-SW-2	NR	NR	NR	NR	NR
07-111-SW-2	76	< 5.0	6	< 0.05	NR

LEGEND

07-111-SE2 – Dongradient sample (From Silver Belt).
SE1 – Across from dump where stream first appears.
WR1 – A composite of subsamples WR1A and B (2/3 A and 1/3 B).
BACKGROUND – From Maud S. Mine (07-129-SS-1).

GW1 – Adit discharge from adit #1.
07-111-SW2 – Same as 07-111-SE2 sample.
SW1 – Same as SE1.
SW2 – QA Blank.

XRF ANALYSIS RESULTS

FAIRPLAY
PA NO. 07-112

MDSL AMRB/PIONEER 4/9/93

Mine Name: Fairplay PA# 07-112
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
07-112-WR1-A		22905.8	1512	1602.79	121.778 *		41399.5	435.912 *	296.522	12218.3		23.5799 *
07-112-WR1-B		41952.7	23621.4	1252.66	138.729 *	2838.82	15728.8			1322.42		83.3353
07-112-WR-1-COMP		33020.3	14245.5	1565.35		1181.92 *	29474.8		160.918 *	3057.65		56.2925

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
07-112-WR1-A	38.6438			16516.9	205.398			28.8583 *	221.575 *		30.974 *
07-112-WR1-B	47.6203			539.904	204.389			381.895			
07-112-WR-1-COMP	67.8267			8309.32	187.775			167.395	155.002 *		

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

FAIRPLAY
PA NO. 07-112

MDSL AMRB/PIONEER 4/9/93

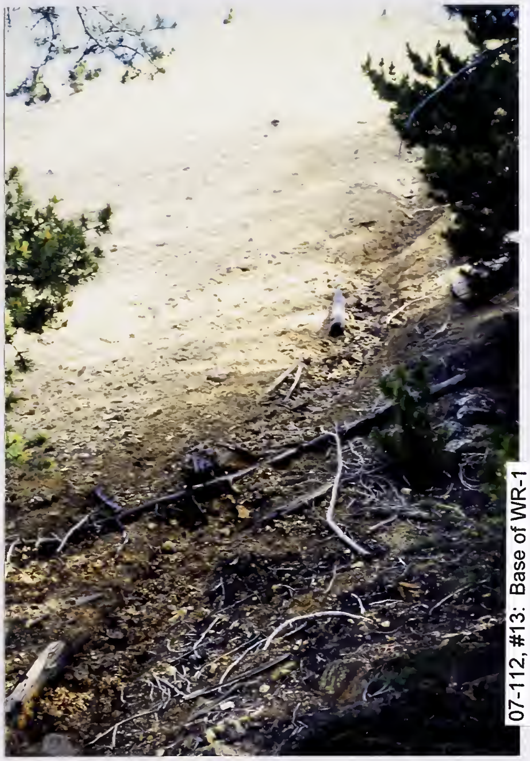
AIMSS SCORESHEET

SITE NAME: FAIRPLAY
PA NUMBER: 07-112

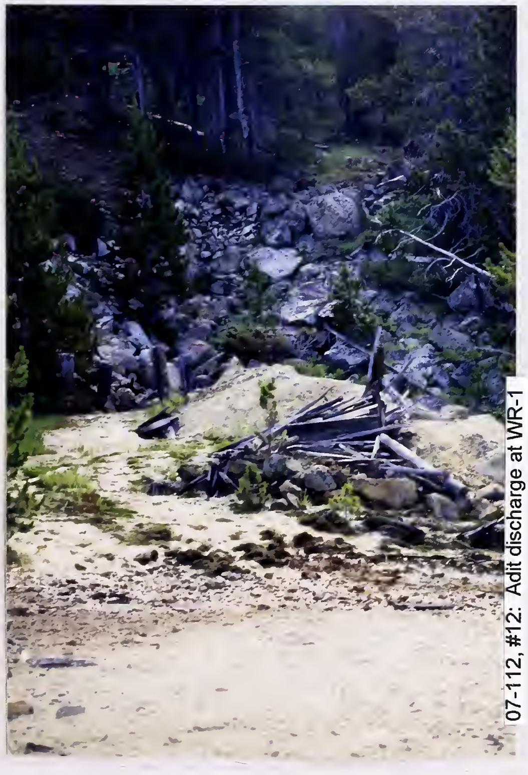
LINE NO.				
		GROUNDWATER PATHWAY		
1		OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A	GW - LIKELIHOOD OF RELEASE	CONTAINMENT		20
3B		GW DEPTH		10
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	200
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	200
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	19.147
6		WELLS - 1 MI. x 2.5		7.5
7	GW - TARGETS	WELLS - 1 TO 4 MI		10
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	17.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	67015
		SURFACE WATER PATHWAY		
11		OBSERVED RELEASE		300
12	SW - LIKELIHOOD OF RELEASE	EXCEEDENCES		50
13A		CONTAINMENT		20
13B		DISTANCE TO SW		10
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	200
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	550
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	21.014
16		DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		1
18		WETLANDS		10
19	SW - TARGETS	FISHERY		0
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 - 22	18
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	208039
		AIR PATHWAY		
25		OBSERVED RELEASE		0
26A	AIR - LIKELIHOOD OF RELEASE	CONTAINMENT		10
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	50
27		LIKELIHOOD SCORE	LINES 25 + 26C	50
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.204
29		POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		0
31	AIR - TARGETS	WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 - 33	30
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	306
		DIRECT CONTACT PATHWAY		
36		OBSERVED EXPOSURE		0
37A	LIKELIHOOD OF EXPOSURE	ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	100
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.186
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		30
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 - 42	30
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	558
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**2.76**

SITE NAME: FAIRPLAY
PA NUMBER: 07-112

LINE NO.		SITE SAFETY		
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 - 7	0
9		POPULATION - 1 MILE		30
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 - 11	30
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**0.00**



07-112, #13: Base of WR-1



07-112, #12: Adit discharge at WR-1

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: ATLANTUS PA#: 07-113

Date: June 2, 1993 Time: 1745

Field Team Leader: Tuesday, Pioneer

Sampling Personnel: Belanger, Pioneer
Lasher, Pioneer

Visitors: None

Weather/Seasonality Observations: Cool; mostly cloudy; cool, wet spring.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #8: Looking into HMO; #9: Dump; #10: HMO. No video tape was taken.

General Comments/Observations (not covered specifically in attached Inventory Forms): There is a dangerous HMO which is very deep and steep. The dump is minor. There were no lab samples taken.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Push dump into HMO and add dirt to completely fill HMO.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): ATLANTUS **PA#:** 07-113

Legal Description: T 14N ;R 8E ;Sec. 29 , SE1/4SE 1/4 ___1/4

County: CASCADE **Mining District:** NEIHART

Latitude: N 46° 56' 14" **Longitude:** W 110° 43' 44"

Primary Drainage Basin and Code: Belt Creek/10030105
Secondary Drainage Basin: Compromise Gulch

USGS Quadrangle map name(s): Neihart

Mine Type/Commodities: Hardrock/Gold, Silver, Lead, Zinc

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Private
Owner, Agent, or Contact(Include address and phone when available): Peter Antonioli, Neihart Consolidated Mining Co., 1001 W. Gold Street, Butte, MT 59701. (406) 723-8730.

Relationship to other mines/sites in the area/district: Located next to the Hartley mine and was originally owned and operated by the same company who operated the Hartley.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 6240' , Slope 21° ,
Aspect South

Land use: Mining___, Recreational X , Residential___, Urban___,
Agricultural___, Other(Specify)___

Area of disturbed/unvegetated lands? <1/16 acres.
Dimensions: 30'x33'

Predominant vegetation types: Lodgepole pine forest

Access: roads - good X ,poor___,4wd___,trail___.
Other logistical considerations (proximity to other sites). On the same road to the Broadwater, Hartley, Dacotah, and Silver Belt sites.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 3 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies on the north side of the perennial Compromise Gulch. Compromise Gulch flows southwest away from the site to Belt Creek 1/2 mile from site.

Mining/milling history, ore type/tenor, host rock, gangue: No information available.

Mine Operation?
Shafts - Yes X, No ___, # 1, Comment Very hazardous
Adits - Yes ___, No X, # ___, Comment ___
Pits - Yes ___, No X, # ___, Comment ___
Placers - Yes ___, No X, # ___, Comment ___
Other - Yes ___, No X, # ___, Comment ___

Mill Operation? Yes ___, No X. If yes answer the next three questions:

Period(s) of Operation: N/A

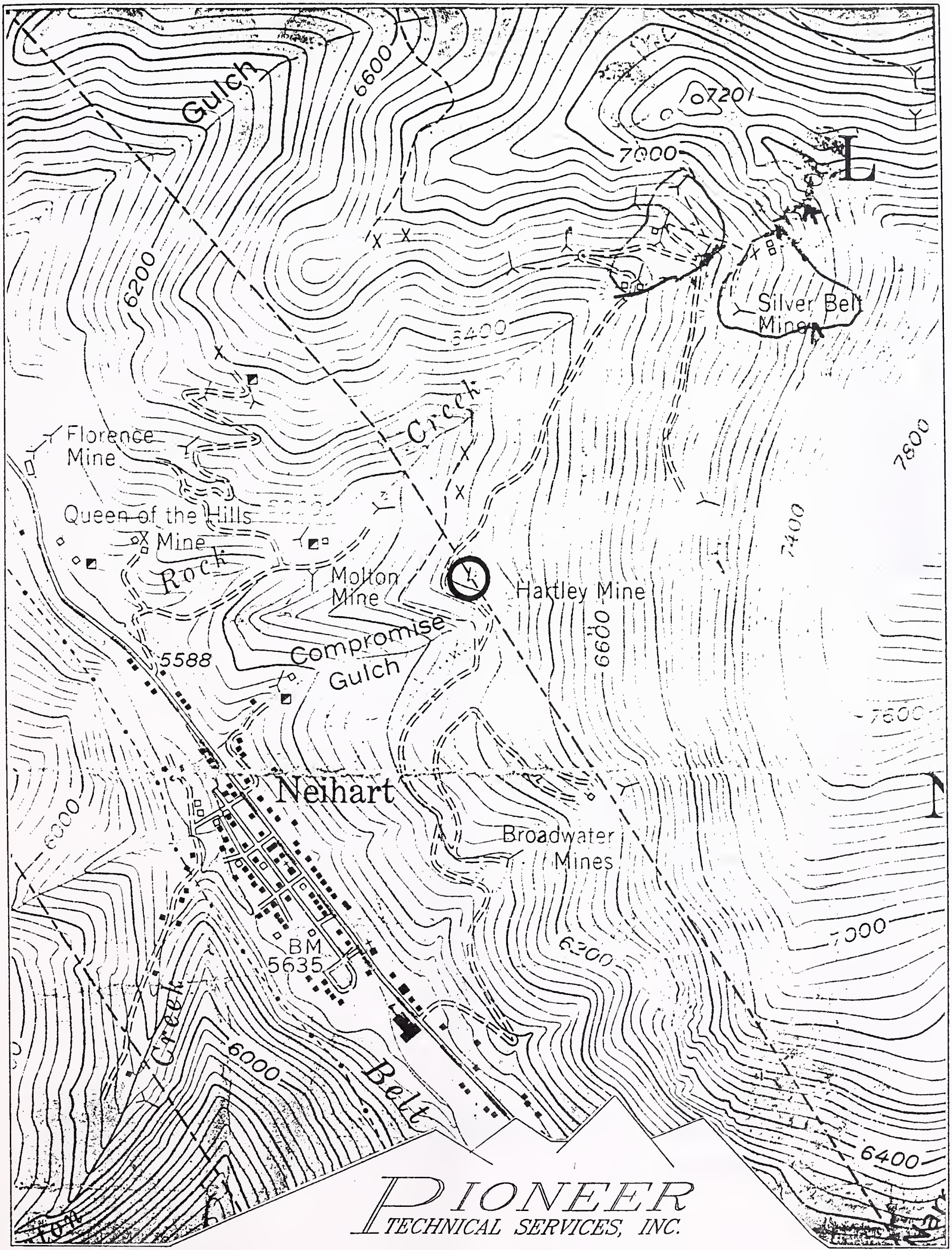
Origin of Ore Milled - Custom Mill ___ Dedicated Mill ___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN^- leach (vat, heap), floatation, smelting?
N/A

Montana Bureau of Mines and Geology
Water Well Log Data

10/22/1993

Well No.	Location	Depth	Yield	Static Water Level
M:123062	14N 08E 20 DBA	41.0	4.0	24.00
M:123061	14N 08E 20 DBA	40.0	7.0	0.00
M:25649	14N 08E 32 BDC	120.0	8.0	7.00

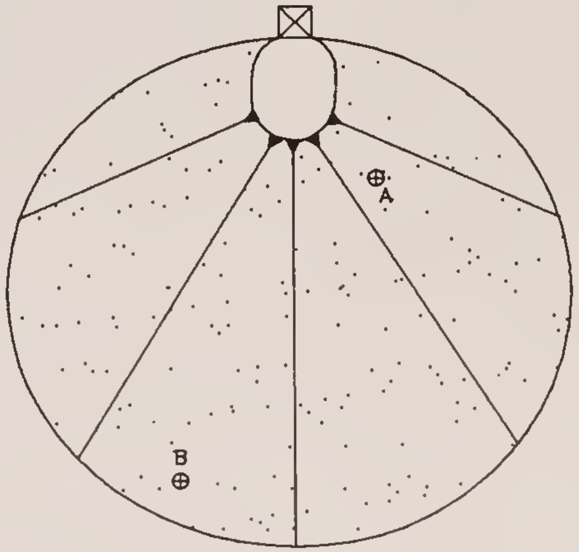


PIONEER TECHNICAL SERVICES, INC.

ATLANTUS, P.A. NO. 07-113

T14N, R08E, SECTION 29

SCALE: 1" = 1000'



WR-1
VOL = 55 CU. YDS
AREA = 85 SQ. YDS

LEGEND

EXISTING	DESCRIPTION	EXISTING	DESCRIPTION
—<	OPEN ADIT	━━	CULVERT
—+<	COLLAPSED ADIT	☼	LIGHT (LIGHT POLE)
⊠	OPEN SHAFT	⌀	UTILITY POLE
■	COLLAPSED SHAFT	●	CENTERLINE MONUMENT
◯	EXCAVATION	●	DECIDUOUS TREE
◯	WASTE ROCK DUMP	✱	CONIFEROUS TREE
✕✕✕	COLLAPSED TIMBERS	—·—·—	WOOD FENCE
——	RAILS	-•-•-•-	WIRE FENCE
∴	DUMP	▨	BUILDING
⊕	XRF SAMPLE	○	BARRIER POST
⊕ᵂ	WATER SAMPLE GROUND AND SURFACE	⋏	GATE
←—	DRAINAGE	-·-·-	EDGE OF ASPHALT
●	WATER WELL	— — —	EDGE OF GRAVEL
		▼	SLOPE DIRECTION

DRAWN WWC DATE 10/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

PIONEER

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS-BOZEMAN-KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

ATLANTUS PA# 07-113
NEIHART DISTRICT CASCADE COUNTY

SHEET NO.

07-113.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution(approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable(based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment(Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Tuesday, Belanger

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	55	Upper east side of dump	None	6.8 (D)	0.07	N/A	N/A	XRF Analysis
WR-1B	WR		Lower west side of dump	None	6.7 (D)	0.06	N/A	N/A	XRF Analysis

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs:

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No_X_, Number:____ Identification:____

Filled shafts: Yes___, No_X_, Number:____ Identification:____

Seeps/Springs: Yes___, No_X_, Number:____ Identification:____

Groundwater wells within 4 miles?: Yes_X_, No___;
Number of well logs:_13_

Distance to nearest well used for drinking?_1/2 mile to Neihart wells_

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible____, Unlikely_X_.
Low metals values, small dump that is located high on a ridge, and no water in shaft or seeps observed.

Other observations/notes:____

GROUNDWATER INVENTORY FORM

SAMPLERS: ______________________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______________________________

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No X , Name(s):

Dry streambeds: Yes X , No___, Name(s): Compromise Gulch is 500 feet downhill.

Other surface water: Yes____, No X , Name(s)/Description:

Waste materials within any floodplain: Yes____, No X Source ID(s):

Approximate Flood frequency?___1 yr,___10 yr,___100 yr

Estimated seasonal flow of stream(s) (cfs)? N/A
High Flow:__________, Average Flow:__________

Distance between waste source(s) and nearest surface water body (ft)? 500 feet to Compromise Gulch.

Surface water draining onto or through waste sources: Yes____, No X ,
Describe:

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Possible irrigation, agriculture, recreation

Observed erosional/sedimentation/stream turbidity problems? Yes____, No X , Distance downstream (ft)?________ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):

SURFACE WATER INVENTORY FORM

SAMPLERS: ______________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.											

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______________________

____

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides? (SO_3)

Presence of evaporative salt deposits? (ESD)

Discolored or turbid seepage? (SPG)

Presence of long filamentous algae in drainages, mosses in moist areas?

Presence of ferric hydroxide precipitates? (FEOX)

Presence of burned or stressed vegetation? (VEG)

pH ≤ 5.0 (pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? None

Wetlands present: Yes___, No X , Describe:

Carbonate rocks/soils: Yes___, No X , Describe:

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X ; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 1/2 mile

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Tuesday, Belanger

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	FEOX in dump	Dry	765	765	Yes	Low

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_, Describe:____

Population within 1 mile: 1-10___; 10-30___; 30-100_X_; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments____

Evidence of recreational use on site: Yes___, No_X_, Describe:________
____

Accessibility - Fences, warning signs, closed roads?_Unrestricted_
____

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment__________________
Wilderness Area - Yes___, No_X_, Comment__________________
T&E Species Habitat - Yes___, No_X_, Comment__________________
Bat Habitat - Yes___, No_X_, Comment__________________

Primary Drainage_X_; Secondary Drainage___; No Information___:

Riparian Habitat Quality - High_X_, Medium___, Low___
Wetlands Frontage - High___, Medium_X_, Low___
Fisheries Habitat and Species Classification - _3_
Sport Fishery Classification - _3_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_1_, types and locations:___ Shaft is partially caved but very hazardous.
____

Hazardous structures: Yes___, No_X_, Number____, types and locations:_
____
____

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____, types and locations:____
____

Unstable waste piles, impoundments, undercut banks: Yes____, No_X_, Number____, types and locations:____
____
____

Fire and/or Explosion hazards: Yes___, No_X_, Explain:__________________
____

Bibliography

MBMG, Geology and Ore Deposits of the Neihart Mining District, Cascade County, Montana, Memoir No. 13, Written by Paul A. Schafer, July 1935.

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for the Atlantus mine, Prepared by Chen-Northern, September 17, 1989.

USGS, Topographic Map, Neihart, Montana, 7 1/2 minute Quadrangle, 1961.

XRF ANALYSIS RESULTS

ATLANTUS
PA NO. 07-113

Mine Name: Atlantus PA# 07-113
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
07-113-WR1-A		33110	2683.51	871.636		20804.4	44266.3		172.318 *	1835.81		90.9679
07-113-WR1-B		27693.3	2233.93	1240.72		13113.9	36693.6		118.494 *	1335.84		51.2595

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
07-113-WR1-A	382.345		12.0231 *	3680.84	143.668		64.1728 *	4231.59	382.594		34.0932 *
07-113-WR1-B	353.423		12.0342 *	4363.42	131.04		53.1716 *	1823.48	302.963	18.0121 *	36.9178 *

	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)
07-129-SS-1	19 J	110	0.4	7.4	10.4	11	12000	0.142	320	10	138	3	115

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

ATLANTUS
PA NO. 07-113

AIMSS SCORESHEET

SITE NAME: ATLANTUS
PA NUMBER: 07-113

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		10
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	200
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	200
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.078
6	GW - TARGETS	WELLS - 1 MI. x 2.5		7.5
7		WELLS - 1 TO 4 MI		10
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	17.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	273
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		2
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	40
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	40
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.086
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		5
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 - 22	22
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	76
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		10
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	50
27		LIKELIHOOD SCORE	LINES 25 + 26C	50
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.009
29	AIR - TARGETS	POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		0
31		WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 - 33	40
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	18
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		0
37A		ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	100
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.008
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		30
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 - 42	30
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	24
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE**	(LINES 10 + 24 + 35 + 44) / 100,000		**0.00**

SITE NAME: ATLANTUS
PA NUMBER: 07-113

SITE SAFETY

LINE NO.				
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	100
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 - 7	100
9		POPULATION - 1 MILE		30
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 - 11	30
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**60.00**

07-113, #8: HMO

07-113, #9: Dump

07-113, #10: HMO

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: STALLABRASS PA#: 07-120

Date: July 30, 1993 Time: 1100-1330

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Clark, Pioneer
Pierson, TD&H

Visitors: Owners of permanent residence

Weather/Seasonality Observations: Clear; breezy; approx. 70°F; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #33: WR-2 and WR-3; #34: WR-1; #35: Residential area; #36: TP-1; Neihart tailings hauled to this site. No video was taken.

General Comments/Observations (not covered specifically in attached Inventory Forms): Mine dump area partially reclaimed by owner. Property owner had 50 cu. yds. of Neihart Tailings hauled in during the highway construction project in the late 70's for driveway cover. The material was not used and is presently stored at the MDT Maintenance facility, south end of lot, near the highway.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Cover waste rock and revegetate; or leave alone (owner's intention).

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): STALLABRASS **PA#:** 07-120

Legal Description: T 13N ;R 8E ;Sec. 4 , SW1/4 NW1/4 ___1/4

County: CASCADE **Mining District:** NEIHART

Latitude: N 46° 55' 11" **Longitude:** W 110° 43' 24"

Primary Drainage Basin and Code: Belt Creek/10030105
Secondary Drainage Basin: Belt Creek

USGS Quadrangle map name(s): Neihart

Mine Type/Commodities: Hardrock/Gold (no significant production)

Activity Status: Active___, Inactive/Exploration___, Abandoned X .

Ownership status: Known YX N__; private/public? Private/Public
Owner, Agent, or Contact (Include address and phone when available): Susan Werner, Karamu Inc., 314 North 18th, Bozeman, MT 59715; Lewis and Clark National Forest.

Relationship to other mines/sites in the area/district: Unknown

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? Area has been cleaned up and partially reclaimed by the property owners/residences.

General site features: Elevation 5800', Slope 0°-25°,
Aspect Northeastern

Land use: Mining___, Recreational___, Residential X , Urban___,
Agricultural___, Other(Specify)___

Area of disturbed/unvegetated lands? 0.5 acres.
Dimensions:

Predominant vegetation types: Lodgepole pine, willow, raspberry, blue bunch wheatgrass, alder, Engleman spruce

Access: roads - good X , poor___, 4wd___, trail___.
Other logistical considerations (proximity to other sites). N/A

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 3 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies on the south side of perennial Belt Creek. Belt Creek flows northwest away from the site.

Mining/milling history, ore type/tenor, host rock, gangue: No information available.

Mine Operation?

Shafts - Yes___, No X, # ___, Comment

Adits - Yes X, No___, # 3, Comment 1 gated; 2 open

Pits - Yes___, No X, # ___, Comment

Placers - Yes___, No X, # ___, Comment

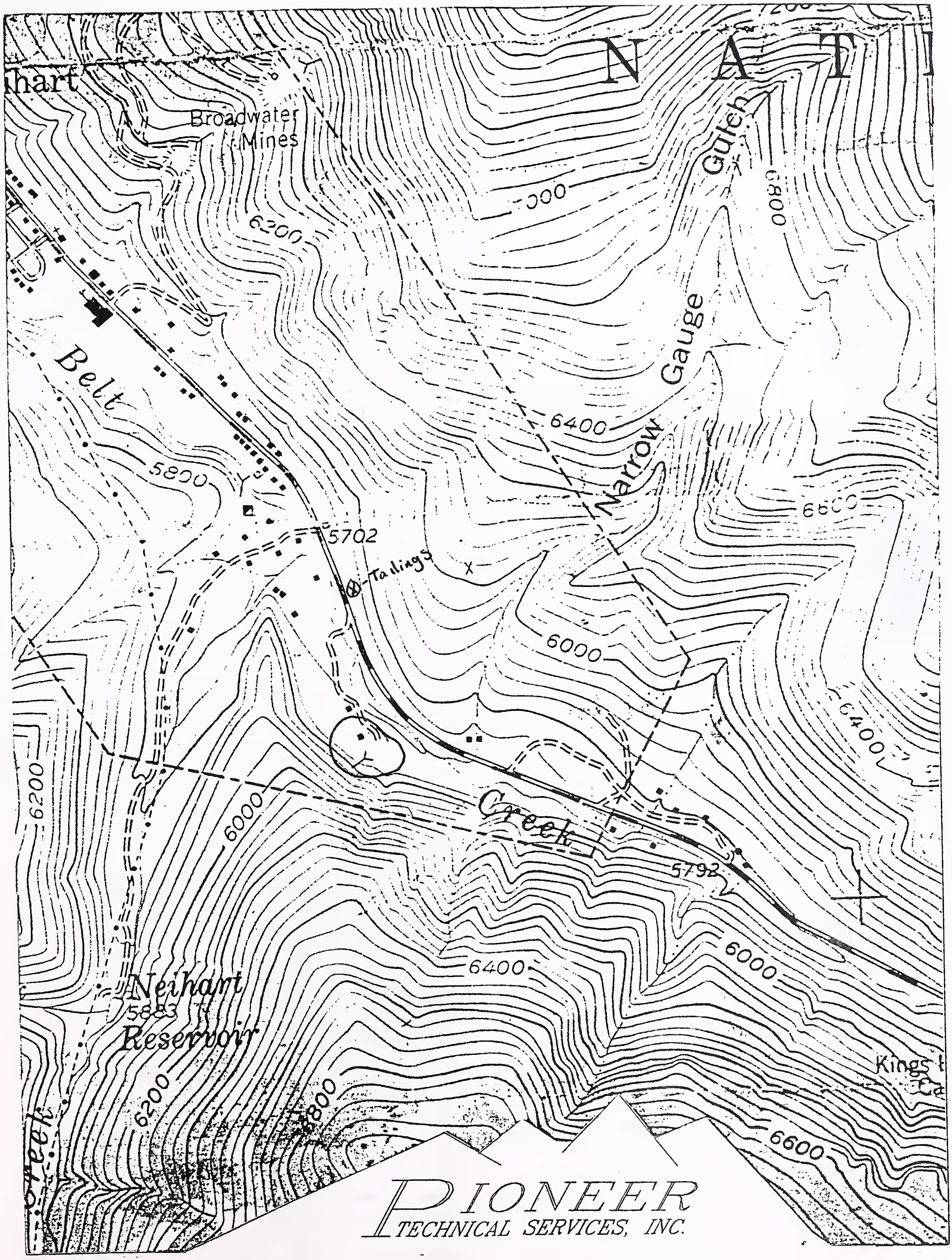
Other - Yes___, No X, # ___, Comment

Mill Operation? Yes___, No X. If yes answer the next three questions:

Period(s) of Operation: N/A

Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
N/A

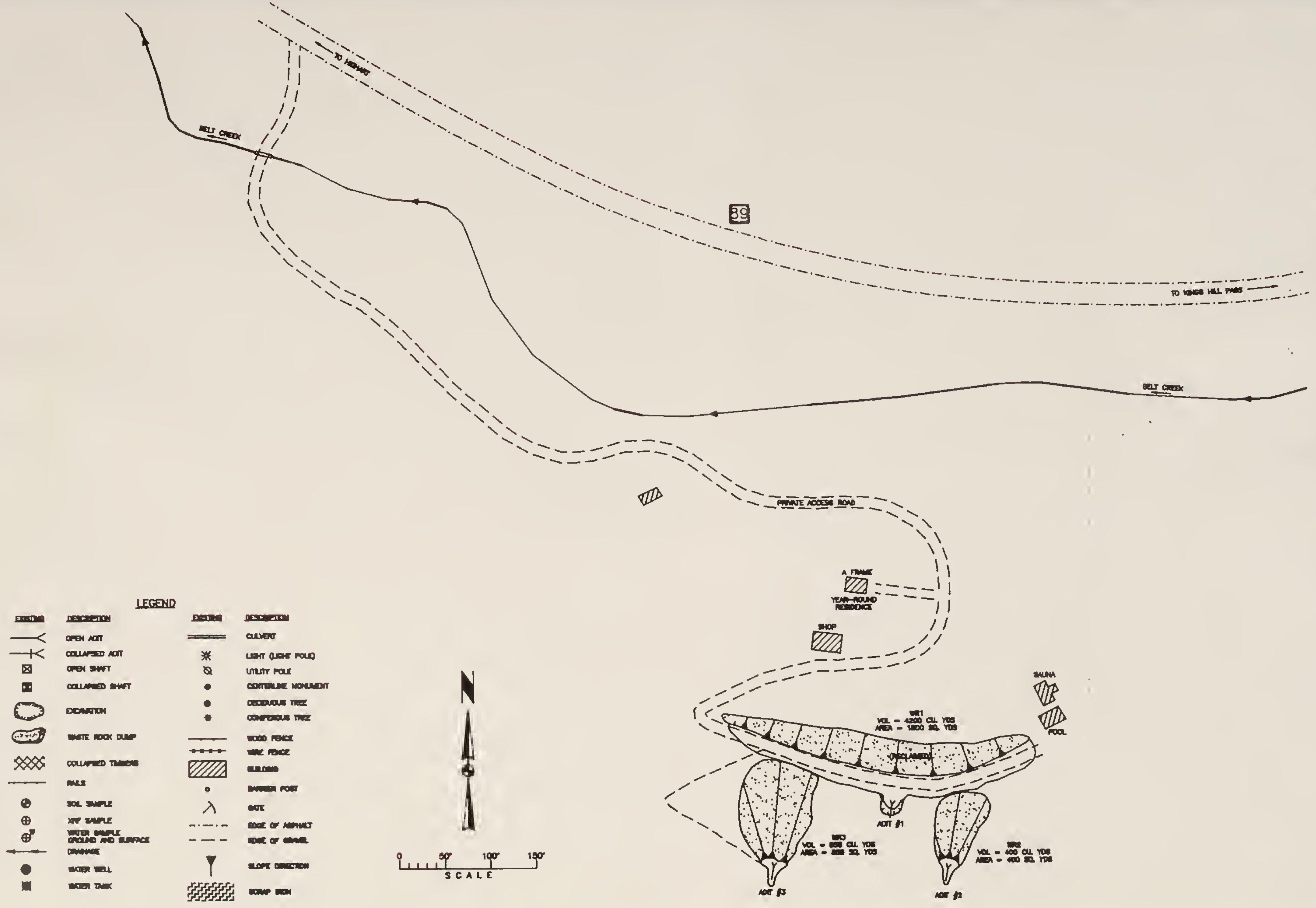


PIONEER
TECHNICAL SERVICES, INC.

STALLABRASS, P.A. NO. 07-120

T13N, R08E, SECTION 04

SCALE: 1" = 1000'



DRAWN WWC DATE 12/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

PIONEER

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS-BOZEMAN-KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

STALLABRASS PA# 07-120
NEIHART DISTRICT CASCADE COUNTY

SHEET NO.

07-120.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): TP-1 is Neihart Tailings hauled to this site.

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): No impoundment; tailings are piled on the highway right-of-way.

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Bullock/Pierson

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1	WR	4,200	Composite from unvegetated areas on the dump	None	6.6 (D)	0.05	07-120-WR-1	07/30/93 1730	T-Metals, ABA
WR-2	WR	400	Above WR-1 to the southeast	None	N/A	N/A	N/A	N/A	N/A
WR-3	WR	858	Above WR-1 to the southwest	None	N/A	N/A	N/A	N/A	N/A
TP-1	TAIL	50	Pile of Neihart Tailings at MDT maintenance facility	None	N/A	0.025	07-120-TP-1	07/30/93 1400	T-Metals, ABA

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs:

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No_X_, Number:____ Identification:______________

Filled shafts: Yes___, No_X_, Number:____ Identification:______________

Seeps/Springs: Yes___, No_X_, Number:____ Identification:______________

Groundwater wells within 4 miles?: Yes_X_, No___;
Number of well logs: 8

Distance to nearest well used for drinking? Approx. 1/2 mile

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible____, Unlikely_X_.
Shallow workings do not appear to contact groundwater.

Other observations/notes: On-site residences actually pump water from Belt Creek instead of using groundwater. No wells are present on-site.

GROUNDWATER INVENTORY FORM

SAMPLERS: ____

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X , No ___, Name(s): Belt Creek is approx. 150 yds. from the base of the waste rock.

Dry streambeds: Yes ____, No X , Name(s): ____

Other surface water: Yes ____, No X , Name(s)/Description: ____

Waste materials within any floodplain: Yes X , No ___ Source ID(s): WR-1

Approximate Flood frequency? ___ 1 yr, ___ 10 yr, X 100 yr

Estimated seasonal flow of stream(s) (cfs)?
High Flow: 100+ cfs , Average Flow: 15-20 cfs

Distance between waste source(s) and nearest surface water body (ft)? 150 yds

Surface water draining onto or through waste sources: Yes ____, No X ,
Describe: ____

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Fishery, riparian, wetlands, stock watering, drinking water on-site

Observed erosional/sedimentation/stream turbidity problems? Yes ____, No X , Distance downstream (ft)? ____ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
None observed during this investigation.

SURFACE WATER INVENTORY FORM

SAMPLERS: ______________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.											

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______________________

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? N/A

Wetlands present: Yes___, No X , Describe:

Carbonate rocks/soils: Yes___, No X , Describe:

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X ; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 50 feet

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock, Pierson

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH /MODERATE/LOW/NONE)
WR-1	SO3	Dry	16,200	8,100	No	None
WR-2	None	Dry	3,600	2,340	Yes	Low
WR-3	None	Dry	7,720	5,960	Yes	Low
TP-1	Low pH	Partial	5,000	5,000	Yes	Moderate

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes_X_, No____, Describe: Year round residence on-site

Population within 1 mile: 1-10___; 10-30_X_; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments____

Evidence of recreational use on site: Yes_X_, No___, Describe: Pool and hot tub

Accessibility - Fences, warning signs, closed roads? Private residential area

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment____
Wilderness Area - Yes___, No_X_, Comment____
T&E Species Habitat - Yes___, No_X_, Comment____
Bat Habitat - Yes_X_, No___, Comment Possible

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High___, Medium_X_, Low___
Wetlands Frontage - High___, Medium___, Low_X_
Fisheries Habitat and Species Classification - _3_
Sport Fishery Classification - _3_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_3_, types and locations: Two open; one gated

Hazardous structures: Yes___, No_X_, Number____, types and locations:____

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____, types and locations:____

Unstable waste piles, impoundments, undercut banks: Yes____, No_X_, Number____, types and locations:____

Fire and/or Explosion hazards: Yes___, No_X_, Explain:____

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Stallabrass, Prepared by Chen-Northern, September 18, 1989.

USGS, Topographic Map, Neihart, Montana, 7 1/2 minute Quadrangle, 1961.

LABORATORY ANALYTICAL DATA

STALLABRASS
PA NO. 07-120

Stallabrass Pa# 07-120
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BULLOCK
INVESTIGATION DATE: 07/30/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
07-120-TP-1	181 J	3000 J	17.9 J	2.3 U	9.3 J	157 J	30900	0.116 JX	7960	12	7320	14 J	4570 J	NR
07-120-WR-1	165 J	2880 J	2.4 J	5.9	11.5 J	76.1 J	36700	3.54 JX	549	21	1800	27 J	673 J	NR
BACKGROUND	19 J	110	0.4 UJ	7.4	10.4	11	12000	0.142	320	10 J	138	3 UJ	115	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
07-120-TP-1	0.74	23.1	10.1	-13.0	<0.01	0.39	0.38	12.2	-2.05
07-120-TP-1DUP	0.72	22.5	10.9	-11.6	<0.01	0.38	0.37	11.9	-0.98
07-120-WR-1	0.72	22.5	14.5	-8.02	0.35	0.08	0.29	2.50	12.0

LEGEND

TP1 - Pile of Neihart Tailings at MDT maintenance facility.
WR1 - Composite from unvegetated areas on dump.
BACKGROUND - From the Maud S. Mine (07-129-SS-1).
TP1DUP - Duplicate of the 07-120-TP-1 sample.

XRF ANALYSIS RESULTS

STALLABRASS
PA NO. 07-120

Mine Name: Stallabrass PA# 07-120
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
07-120-WR-1	524.734 *	32021.6	5205.65	2181.84		623.957 *	54263.4	401.93 *	151.276 *	846.415		336.559
	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th	
07-120-WR-1	293.041			2023.86	156.542		70.814 *	15134.5		15.617 *	9.72813 *	

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

STALLABRASS
PA NO. 07-120

AIMSS SCORESHEET

SITE NAME: STALLABRASS
PA NUMBER: 07-120

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		10
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	200
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	200
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	5.780
6	GW - TARGETS	WELLS - 1 MI. x 2.5		7.5
7		WELLS - 1 TO 4 MI		5
8		NEAREST WELL		5
9		TARGETS SCORE	LINES 6 + 7 + 8	17.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	20230
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		2
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	40
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	40
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	6.391
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		5
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 - 22	22
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	5624
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		15
26B		DISTANCE TO POPULATION		20
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	300
27		LIKELIHOOD SCORE	LINES 25 + 26C	300
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.102
29	AIR - TARGETS	POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		10
31		WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 - 33	40
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	1224
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		250
37A		ACCESSIBILITY		1
37B		DISTANCE TO POPULATION		20
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	20
38		LIKELIHOOD SCORE	LINES 36 + 37C	270
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.092
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		10
41		NEAREST RESIDENCE		10
42		RECREATIONAL USE		10
43		TARGETS SCORE	SUM LINES 40 - 42	30
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	745
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**0.28**

SITE NAME: STALLABRASS
PA NUMBER: 07-120

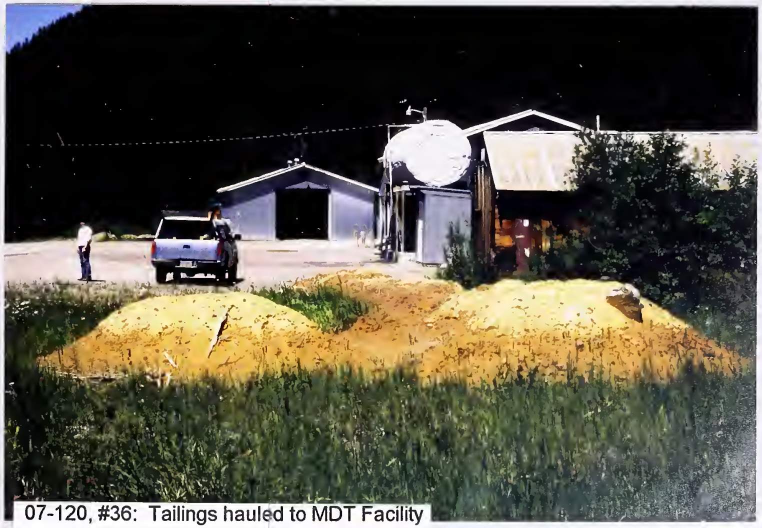
SITE SAFETY

LINE NO.				
1	THREAT	ACCESSIBILITY		1
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	150
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 - 7	150
9		POPULATION - 1 MILE		10
10	TARGETS	NEAREST RESIDENCE		10
11		RECREATIONAL USE		10
12		TARGETS SCORE	SUM LINES 9 - 11	30
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**4.50**

07-120, #33: Opening above dump area

07-120, #34: WR-1

07-120, #35: Residential area



07-120, #36: Tailings hauled to MDT Facility

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: DACOTAH PA#: 07-121

Date: June 8, 1993 Time: 0700

Field Team Leader: Bullock, Babits; Pioneer

Sampling Personnel: Flammang, Lasher, Clark;
Pioneer
Pierson; TD&H

Visitors: None

Weather/Seasonality Observations: Steady rain; cool; slight breeze.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #14: SW-2 and SE-2 sample locations; #15: GW-1, adit; #16: Adit and GW-1 sample location; #17: Adit 4; #18: SW-1 and SE-1 sample locations in Rock Creek. Roll #2: #26: Adit 7; #27: Adit 8; #28: WR-7 and -8; #29: Adit #7; #30: WR-7 and -8; #31: WR-1; #32: WR-1 and Rock Creek; #33: Adit 1; #34: WR-5; #35: Adit 3; #36: WR-3. Video Tape No. 2

General Comments/Observations (not covered specifically in attached Inventory Forms): N/A

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Very large and steep waste rock to recontour, topsoil, amend, and revegetate; possible to reprocess. Treat adit discharges. Close adits.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): DACOTAH PA#: 07-121

Legal Description: T 14N ;R 8E ;Sec. 28 , NW1/4 SW1/4 ___ 1/4

County: CASCADE Mining District: NEIHART

Latitude: N 46° 56' 45" Longitude: W 110° 43' 24"

Primary Drainage Basin and Code: Belt Creek/10030105
Secondary Drainage Basin: Rock Creek

USGS Quadrangle map name(s): Neihart

Mine Type/Commodities: Hardrock/Silver, Lead, Zinc

Activity Status: Active ___ ,Inactive/Exploration ___ ,Abandoned X .

Ownership status: Known YX N ___ ; private/public? Private/Public
Owner, Agent, or Contact(Include address and phone when available): Richard Bennett, Monarch Co. Inc., P.O. Box 2267, Great Falls, MT 59403. (406) 452-6933; Lewis and Clark National Forest.

Relationship to other mines/sites in the area/district: Near Fairplay, Silver Belt, and Maud S. mines.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 6700' , Slope 25° ,
Aspect Southwestern

Land use: Mining X , Recreational X , Residential ___ , Urban ___ ,
Agricultural ___ , Other(Specify)

Area of disturbed/unvegetated lands? 5 acres.
Dimensions:

Predominant vegetation types: Lodgepole pine, sub alpine fir, kinnikinick

Access: roads - good ___ ,poor X ,4wd X ,trail ___ .
Other logistical considerations (proximity to other sites).

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 3 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Vein deposits start in Pinto Diorite, changes to black amphibolite-gneiss. Dumps show leached white gneiss impregnated with pyrite. Site lies in the headwaters of Rock Creek, which flows southwest off of the site to its confluence with Belt Creek a mile away.

Mining/milling history, ore type/tenor, host rock, gangue: Vein material is mainly crushed altered country rock containing galena, sphalerite, pyrite, and silver, sulfides in bands and disseminations. Gangue mineral is primarily quartz.

Mine Operation?
Shafts - Yes___, No X , # _____, Comment
Adits - Yes X , No___, # 7 , Comment 1 open
Pits - Yes___, No X , # _____, Comment
Placers - Yes___, No X , # _____, Comment
Other - Yes___, No X , # _____, Comment

Mill Operation? Yes X , No____. If yes answer the next three questions:

Period(s) of Operation: September 1943 to June 1949

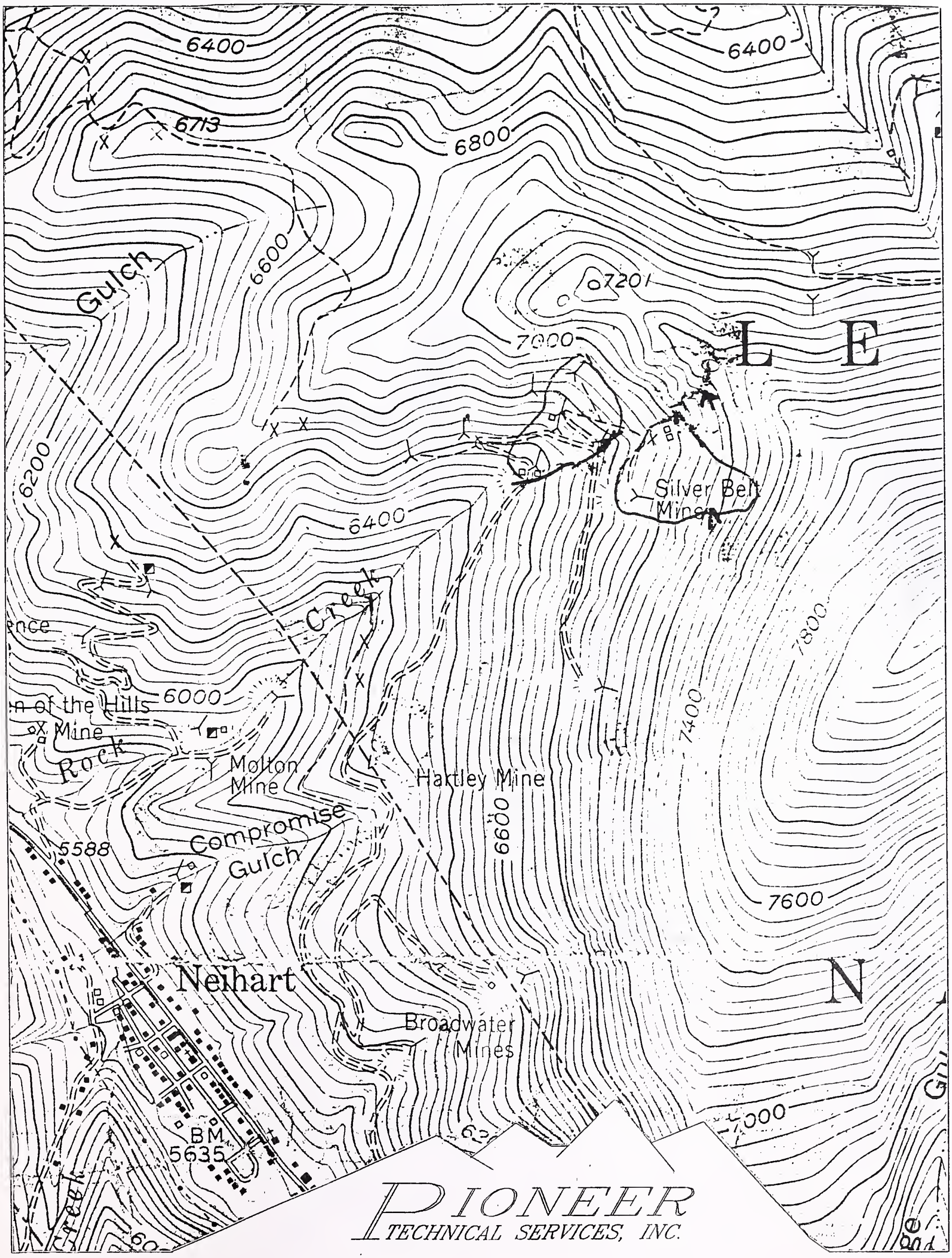
Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: Evidence of mill not found - loadouts

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting? 75-ton flotation mill (old Florence mill)

Montana Bureau of Mines and Geology
Water Well Log Data

10/22/1993

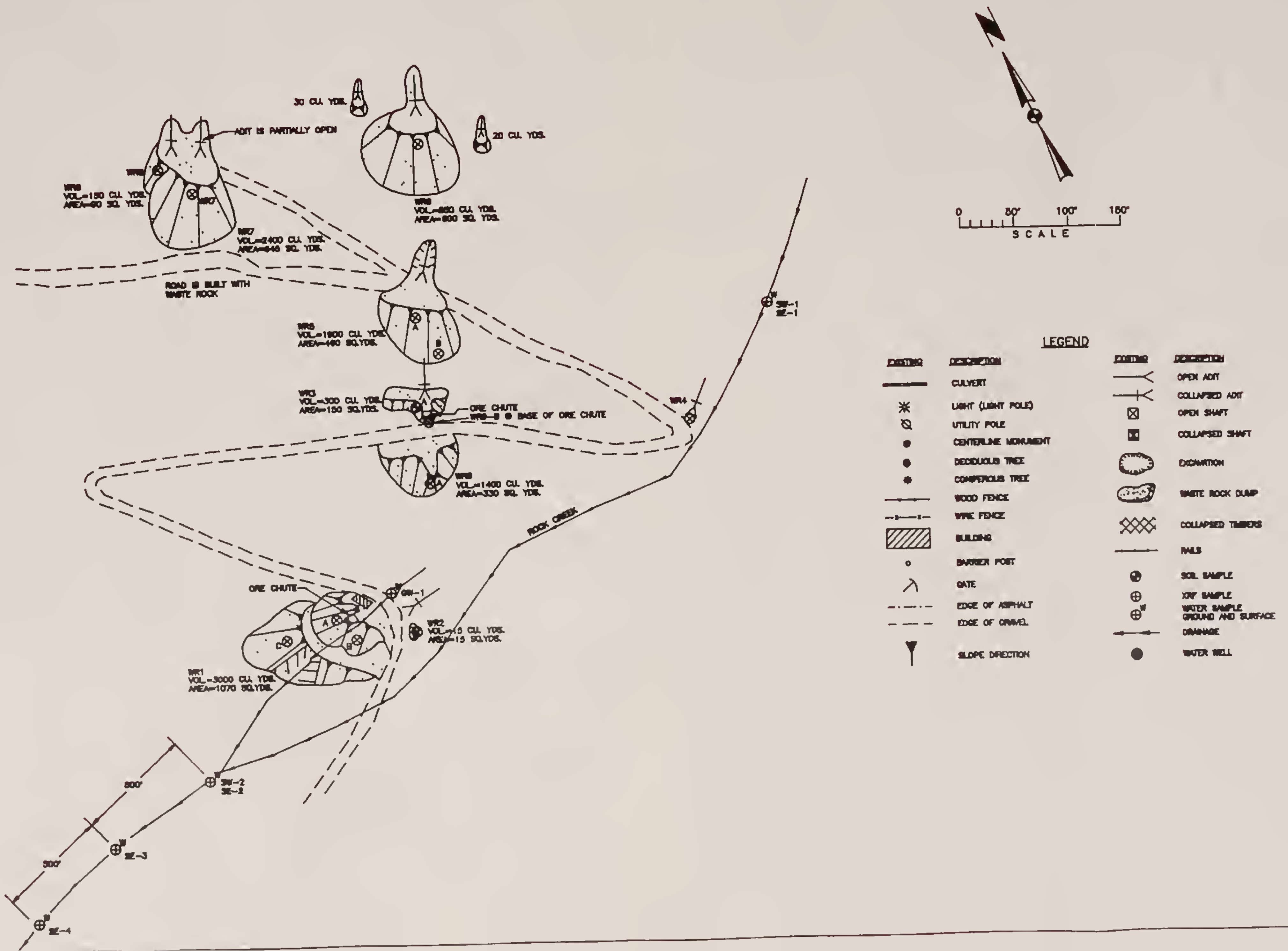
Well No.	Location	Depth	Yield	Static Water Level
M:123062	14N 08E 20 DBA	41.0	4.0	24.00
M:123061	14N 08E 20 DBA	40.0	7.0	0.00
M:25649	14N 08E 32 BDC	120.0	8.0	7.00



PIONEER TECHNICAL SERVICES, INC.

DACOTAH, P.A. NO. 07-121

T14N, R08E, SECTION 28
SCALE: 1" = 1000'



DRAWN JTP DATE 21 SEPT 93
DESIGNED TPR JOB NO. 93-17
APPROVED WJB F.B. NO.

PIONEER

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

DACOTAH MINE PA# 07-121
NEIHART DISTRICT CASCADE COUNTY

SHEET NO.

07-121.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Bullock, Pierson

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	3,000	Dump assoc. with Adit #1; west of ore chute	None	< 3.5 (D)	0.03	07-121-WR-1	06/08/93 1245	T-Metals, ABA
WR-1B	WR		Dump assoc. with Adit #1; south side of upper part	None	5.2 (D)	0.03			
WR-1C	WR		Dump assoc. with Adit #1; lower part of dump	None	< 3.5 (D)	0.03			
WR-2	WR	15	Dump assoc. with Adit #2; on top	None	5.6 (D)	0.03			
WR-3	WR	300	Dump assoc. with Adit #3; west of adit near top	None	4.4 (D)	0.03	07-121-WR-6	06/08/93 1255	T-Metals, ABA
WR-4	WR	Small	Dump assoc. with Adit #4	None	N/A	0.03	N/A	N/A	N/A
WR-5A	WR	1,900	Dump assoc. with Adit #5; southwest of adit near top	None	5.0 (D)	0.03			
WR-5B	WR		Dump assoc. with Adit #5; south end of dump near bottom	None	< 3.5 (D)	0.03			
WR-6	WR	850	Dump assoc. with Adit #6; west of adit near top	None	3.5 (D)	0.03	07-121-WR-6	06/08/93 1240	T-Metals, ABA
WR-7	WR	2,400	Dump assoc. with Adit #7; west of adit near top	None	5.6 (D)	0.03			
WR-8	WR	150	Dump assoc. with Adit #8; small lobe north of WR-7, near top	None	5.8 (D)	0.03			
WR-9A	WR	1,400	Dump assoc. with loadout from Adits #3 and #5; west side of lobe near top	None	3.85 (D)	0.03			
WR-9B	WR		Dump assoc. with loadout from Adits #3 and #5; at base of ore chute	None	< 3.5 (D)	0.03			

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 07-121-WR-1 is composite of WR-1A through -1C, and WR-2. 07-121-WR-5 is composite of WR-3, WR-5A and -5B, and WR-9A and -9B. 07-121-WR-6 is composite of WR-6, -7, and -8.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes X , No___, Number: 1 Identification: Adit #1

Filled shafts: Yes___, No X , Number:____ Identification:____

Seeps/Springs: Yes___, No X , Number:____ Identification:____

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 13

Distance to nearest well used for drinking? Approx. 1 mile

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable X , Possible____, Unlikely____.
Low pH on groundwater emerging from Adit #1.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: Bullock, Babits

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
GW-1	AD	Adit #1 discharge	5 gpm (M)	2.38	2000	764	6.4	0	N/A	07-121-GW-1	06/08/93 1105	T-Metals, TDS, Hardness, Cl-, SO4, NO2/NO3

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X , No ___, Name(s): Rock Creek

Dry streambeds: Yes ____, No X , Name(s): ____

Other surface water: Yes ____, No X , Name(s)/Description: ____

Waste materials within any floodplain: Yes X , No ___ Source ID(s): WR-1

Approximate Flood frequency? X 1 yr, ___10 yr, ___100 yr

Estimated seasonal flow of stream(s) (cfs)? 35 gpm
High Flow: 100 gpm , Average Flow: 20 gpm

Distance between waste source(s) and nearest surface water body (ft)?
0 feet

Surface water draining onto or through waste sources: Yes X , No ____,
Describe: Flow from Adit #1 drains across WR-1.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Fishery, irrigation, wetlands

Observed erosional/sedimentation/stream turbidity problems? Yes X ,
No _____, Distance downstream (ft)? 1000 Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
Waste rock is in creek.

SURFACE WATER INVENTORY FORM

SAMPLERS: Bullock, Babits

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	Upgradient of Dacotah, downgradient of Fairplay	6.36	128	202	4.8	2	36 gpm (M)	07-121-SW-1	06/08/93 1045	T-Metals, TDS, Hardness, Cl-, SO4, NO2/NO3
SE-1	SE	Upgradient of Dacotah, downgradient of Fairplay	6.15	N/A	N/A	N/A	N/A	N/A	07-121-SE-1	06/08/93 1145	T-Metals
SW-2	SW	Sample of Rock Creek at base of WR-1	2.69	426	660	5.3	2	35 gpm (M)	07-121-SW-2	06/08/93 1045	T-Metals, TDS, Hardness, Cl-, SO4, NO2/NO3
SE-2	SE	Sample of Rock Creek at base of WR-1	5.8	N/A	N/A	N/A	N/A	N/A	07-121-SE-2	06/08/93 1045	T-Metals
SE-3	SE	500 feet downgradient of WR-1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	XRF Analysis
SE-4	SE	1,000 feet downgradient of WR-1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	XRF Analysis

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? None

Wetlands present: Yes X , No___, Describe: 10'x10' wetlands below Adit #3

Carbonate rocks/soils: Yes___, No X , Describe:

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X ; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 1 mile

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock, Babits, Pierson

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	SO3; FEOX; pH	Wet	9,630	9,630	No	Moderate
WR-2	SO3	Wet	135	135	No	Low
WR-3	Some SO3; pH	Wet	1,350	1,350	No	Low
WR-4	None	Wet	Small	All unvegetated	No	Low
WR-5	Little SO3; pH	Wet	4,140	4,140	No	Low
WR-6	Little SO3; pH	Wet	5,400	5,400	No	Low
WR-7	SO3	Wet	4,905	4,905	No	Low
WR-8	SO3	Wet	810	810	No	Low
WR-9	FEOX; Little SO3; pH	Wet	2,970	2,970	No	Low
Adit #1	Mosses; algae; FEOX; low pH	N/A	N/A	N/A	N/A	N/A

Notes and Clarifications: All dumps were wet due to 4-day long spring storm.

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes_____, No__X__,
Describe:____

Population within 1 mile: 1-10___; 10-30___; 30-100_X_; 100-300___;
300-1,000____; 1,000-3,000____; 3,000-10,000____; 10,000 or greater____;
Comments____

Evidence of recreational use on site: Yes___, No_X_, Describe:________
____

Accessibility - Fences, warning signs, closed roads? Unrestricted
____

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment______________________
Wilderness Area - Yes___, No_X_, Comment______________________
T&E Species Habitat - Yes___, No_X_, Comment______________________
Bat Habitat - Yes___, No_X_, Comment______________________

Primary Drainage____; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High___, Medium_X_, Low___
Wetlands Frontage - High___, Medium___, Low_X_
Fisheries Habitat and Species Classification - Not Rated
Sport Fishery Classification - Not Rated

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_1__, types and locations:___
Adit #1
____

Hazardous structures: Yes_X_, No___, Number_3__, types and locations:_
Two loadout structures, WR-9 and WR-1; mine shack at Adit #1
____

Unstable highwalls, pits, trenches, slopes: Yes_X_, No___, Number_1__,
types and locations: Adit #6 and #7 have highwalls; Adit #2 has a subsidence pit.
____

Unstable waste piles, impoundments, undercut banks: Yes_X_, No____,
Number_3__, types and locations: Toes of WR-7 and -8 were cut to get the road in, so they are unstable. WR-1 is eroded by Rock Creek; all waste rock dumps are too steep to revegetate as is, except WR-4.

Fire and/or Explosion hazards: Yes___, No_X_, Explain:________________
____
____

Bibliography

MBMG, Dacotah, Cascade County, Form 39, 1969-1971.

MBMG, Mineral and Industry File 90.0, Dacotah, Cascade County, Montana.

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB, Environmental Assessment Analytical Data for Dacotah, Prepared by MSE, Inc., August 15, October 4, and October 29, 1990.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Dacotah, Prepared by Chen-Northern, September 19, 1989.

USBM, Mines and Mineral Deposits (Except Fuels), Cascade County, Montana, Information Circular No. 7589, Written by Almon F. Robertson, April 1950, pp. 33-35.

USGS, Geology of the Little Belt Mountains, Montana, 20th Annual Report, Written by Weed, Date Unknown, p. 432-433.

USGS, Topographic Map, Neihart, Montana, 7 1/2 minute Quadrangle, 1961.

LABORATORY ANALYTICAL DATA

DACOTAH
PA NO. 07-121

Dacotah PA# 07-121
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BABITS
INVESTIGATION DATE: 06/08/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
07-121-SE-1	38	98.9	63.2 J	13.6 J	33.4	541 J	9170	0.178 J	7920 J	92 J	398	14 U	11300 J	NR
07-121-SE-2	126	133	3 J	6.1 J	12.1	26.6 J	65200	0.063 J	1000 J	12 J	1710	4 U	1270 J	NR
07-121-WR-1	105	56.1	14.9 J	17.8 J	7.5	78.8 J	36300	0.105 J	12800 J	84 J	1780	4 U	4650 J	NR
07-121-WR-5	83	144	9.3 J	2 J	10.3	66.2 J	67500	0.793 J	379 J	4 J	7510	4 U	3110 J	NR
07-121-WR-6	255 J	205	40.1	5.6	5.3	129	40000	0.416	2550	20 J	21800	26 J	10200	NR
BACKGROUND	19 J	110	0.4 UJ	7.4	10.4	11	12000	0.142	320	10 J	138	3 UJ	115	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
07-121-WR-1	3.25	102	37.8	-63.	1.13	0.56	1.56	17.5	20.3
07-121-WR-5	2.37	74	6.28	-67.	1.87	0.03	0.47	0.94	5.34
07-121-WR-6DUP	1.65	51.5	7.7	-43.	0.56	0.29	0.8	9.06	-1.36
07-121-WR-6	1.63	50.9	7.56	-43.	0.54	0.27	0.82	8.43	-0.88

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
07-121-GW-1	5.13	2.24 U	420	196	21.2	90.1	52600	0.047	152000	951	216	220	172000	785
07-121-SW-1	1.61 U	17.7	10.7	5.99 U	6.67	5.07	95.9	0.078	231	12.6	2.52	21.8	3060	51.9
07-121-SW-2	1.96	15	65.9	14	5.33	21.4	1580	0.11	16400	124	48	43.9	22600	141

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
07-121-GW-1	2330	< 5.0	1400	< 0.05	NR
07-121-SW-1	96	< 5.0	53	< 0.05	NR
07-121-SW-2	340	< 5.0	170	0.06	NR

LEGEND

SE1 - Ugradient of Dacotah, downgradient of Fairplay.
SE2 - Sample of Rock Creek at base of waste rock dump 1.
WR1 - Composite of subsamples WR1A, 1B, 1C, and 2.
WR5 - Composite of subsamples WR3, 5A, 5B, 9A, and 9B.
WR6 - Composite of subsamples WR6, 7, and 8.
BACKGROUND - From the Maud S. Mine (07-129-SS-1).

GW1 - Discharge from adit #1.
SW1 - Same as sample SE1.
SW2 - Same as sample SE2.

XRF ANALYSIS RESULTS

DACOTAH
PA NO. 07-121

Mine Name: Dacotah PA# 07-121
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
07-121-SE-1000		4932.66	2003.62	913.199		2040.51 *	180436	856.518 *	114.59 *	1194.6		137.488
07-121-SE-500		12923.5	5416.75	2925.69		1738.72 *	86046.5			1288.21		120.02
07-121-WR1-A		24385.3	7378.61	3295.88		1607.22 *	32347.1		66.6168 *	1219.66		243.835
07-121-WR1-B		36825.7	21618.7	4002.66		18815.2	47222.3		65.5425 *	3507.01		42.39
07-121-WR1-C		18366.5	7727.02	2641.14		2263.82	28658.9		59.6611 *	1476.92		234.309
07-121-WR3-A		38768.8	6815.99	3615.54		2619.45	52457.4		73.2243 *	8648.49		62.6662
07-121-WR5-A		28765.9	6090.54	6132.02		2238.58	94682.2			1255.24		179.355
07-121-WR5-B		21287.7	6149.5	4896.88		3427.08	91368.1		75.6628 *	1221.32		278.369
07-121-WR6-C2D		41097.8	3943.96	3116.92		2657.53	44963			3567.86		98.2219
07-121-WR6-CO2		37886.9	3659.23	3026.7		2241.63	46110.1		103.472 *	3875.24		64.6797
07-121-WR9-A		29823.5	18708.1	3453.92			64204.1			1217.8		92.2214
07-121-WR9-A1		24781	21780.8	3485.35		487.873 *	84221.6		107.076 *	1195.14		84.9752
07-121-WR9-B		24071.3	14218.4	3531.14			88821.8			1278.73		121.227
07-121-WR-1-COMP		36725.4	9484.77	3700.03		10701.5	45767.9		157.345 *	2605.44		114.919
07-121-WR-2		21460.7	4092.4	1768.58		29515.1	39233		161.52 *	13193.1		31.3821 *
07-121-WR-5-COMP		31780.5	8427.19	2784.31		535.225 *	83831.4		83.4226 *	2085.18		86.1809
07-121-WR-5-COMP-DUP		32388	8361.95	2767.49			84587.2			2031.67		102.233
07-121-WR-6		41901.6	1397.49	2593.42			56581.3		191.736 *	3773.63		35.779 *
07-121-WR-6-C2D		41097.8	3943.96	3116.92		2657.53	44963			3567.86		98.2219
07-121-WR-6-CO2		37886.9	3659.23	3026.7		2241.63	46110.1		103.472 *	3875.24		64.6797
07-121-WR-6-COMP		35159.1	2894.6	2893.34		2565.03	71558.7		208.327 *	3380.37		58.8806 *
07-121-WR-7		25078.1	3920.15	2473.45		7837.45	38232			2162.72		94.1675
07-121-WR-8		41221.9	3355.28	3693.19		3451.02	43291.2		89.6943 *	3995		52.0347

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
07-121-SE-1000	163.627			1107.11	70.229 *			475.507	206.251 *		
07-121-SE-500	261.933			751.973	122.868			544.393	164.936 *		
07-121-WR1-A	165.575			374.925	135.486	146.263 *		872.989			14.0932 *
07-121-WR1-B	55.3217			1121.82	227.173	168.433 *		199.777	150.447 *		
07-121-WR1-C	94.3487			464.736	117.838	109.988 *		621.125	76.8458 *		16.5208 *
07-121-WR3-A	97.8162			6323.84	228.321	300.101 *		323.056	196.649 *		25.4589 *
07-121-WR5-A	94.3788			1289.69	184.278	156.968 *		447.311	163.363 *	14.3781 *	
07-121-WR5-B	66.3213			1468.77	124.718			424.862	268.241 *		15.759 *
07-121-WR6-C2D	124.59			15408.5	189.763			800.406	364.019		
07-121-WR6-CO2	120.368			15541.5	222.854			594.865	398.759		34.9558 *
07-121-WR9-A	87.5831			2335.06	161.263	156.427 *		2310.6	84.8085 *		
07-121-WR9-A1	87.3836			2721.8	180.397	143.441 *		770.257	182.335 *		16.8177 *
07-121-WR9-B	92.0803			3994.17	131.933			1199.08	146.638 *		
07-121-WR-1-COMP	130.814			5240.36	206.435	183.908 *		811.939	147.534 *		35.6588 *
07-121-WR-2	71.3209			2944.41	151.725			388.265	150.524 *		
07-121-WR-5-COMP	90 5784			8459.87	174.424	214.179 *		523.409	149.622 *		
07-121-WR-5-COMP-	73.4018			8471.16	171.539	225.226 *		530.419	171.793 *		
07-121-WR-6	116.495			22045.5	176.504	222.647 *		438.03	331.808		80.8545 *
07-121-WR-6-C2D	124.59			15408.5	189.763			800.406	364.019		
07-121-WR-6-CO2	120.368			15541.5	222.854			594.865	398.759		34.9558 *
07-121-WR-6-COMP	78.0692		13.0141 *	25043	209.709	241.743 *		578.814	856.271		72.5866 *
07-121-WR-7	125.339			4765.77	199.886			1438	200.146 *		
07-121-WR-8	90.606			12030.3	241.629	221.909 *		649.513	470.282		47.439 *

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

DACOTAH
PA NO. 07-121

AIMSS SCORESHEET

SITE NAME: DACOTAH
PA NUMBER: 07-121

GROUNDWATER PATHWAY

LINE NO.				
1		OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A	GW - LIKELIHOOD OF RELEASE	CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	99.758
6		WELLS - 1 MI. x 2.5		7.5
7	GW - TARGETS	WELLS - 1 TO 4 MI		10
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	17.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	698306

SURFACE WATER PATHWAY

11		OBSERVED RELEASE		300
12	SW - LIKELIHOOD OF RELEASE	EXCEEDENCES		100
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	800
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	110.268
16		DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		1
18		WETLANDS		10
19	SW - TARGETS	FISHERY		0
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 - 22	18
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	1587859

AIR PATHWAY

25		OBSERVED RELEASE		0
26A	AIR - LIKELIHOOD OF RELEASE	CONTAINMENT		10
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	50
27		LIKELIHOOD SCORE	LINES 25 + 26C	50
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	1.087
29		POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		0
31	AIR - TARGETS	WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 - 33	30
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	1631

DIRECT CONTACT PATHWAY

36		OBSERVED EXPOSURE		0
37A	LIKELIHOOD OF EXPOSURE	ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	100
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.983
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		30
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 - 42	30
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	2949

45 **TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE**
(LINES 10 + 24.+ 35 + 44) / 100,000 **22.91**

SITE NAME: DACOTAH
PA NUMBER: 07-121

LINE NO.		**SITE SAFETY**		
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	50
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	75
5		HAZ. STRUCTURES	40 EA.	120
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 - 7	245
9		POPULATION - 1 MILE		30
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 - 11	30
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**147.00**

SUMMARY OF HISTORICAL ANALYTICAL DATA FROM OTHER SOURCES

SITE NAME: COMPROMISE MINE
DATE: 15-Aug-90

STATION	FLOW (gpm)	pH (s.u.)	SPECIFIC CONDUCTANCE (umhos/cm)	TEMP. (celcius)	COMMENTS
SHAFT	2	5.51	550	7.1	SAMPLE COLLECTED
ADIT	1	6.14	139	8.7	
WEST SEEP (BLW DUMP)	3-5	6.20	245	10.5	
EAST SEEP (BLW DUMP)	5	6.11	205	9.6	
STREAM	9	6.30	308	10	COMBINATION OF THE TWO SEEPS
PIPE (SPRING)	2.5	5.17	530	9.6	APEARS TO BE A DRINKING WATER SOURCE FOR THE RESIDENCE
SEEP (ACCESS RD)		6.02	610	8.0	

SITE NAME: DACOTAH MINE
DATE: 15-Aug-90

STATION	FLOW (gpm)	pH (s.u.)	SPECIFIC CONDUCTANCE (umhos/cm)	TEMP. (celcius)	COMMENTS
SHAFT #1	15	2.97	1700	7.7	SAMPLE COLLECTED, ALKALINITY = 0 MG/L AS CACO
ADIT #4	<1	6.72	111	9.7	
STREAM (ADJ TO #4)	50-75	6.62	90	11.2	

SITE NAME: ROCHESTER PATENT
DATE: 15-Aug-90

STATION	FLOW (gpm)	pH (s.u.)	SPECIFIC CONDUCTANCE (umhos/cm)	TEMP. (celcius)	COMMENTS
STREAM (DOWNGRADIENT)	30	4.55	780	16.1	STREAM RECIEVES DACOTAH #1 DRAINAGE 1/4 MILE SAMPLE COLLECTED AT THIS LOCATION
STREAM	30	4.53	820	15.4	

REPORT DATE: October 4, 1990

CLIENT: Abandon Mines

FIELD ID: Dacota ~~Shaft~~ Adit #1

LAB NO: W8561

DATE RECEIVED: 09-14-90

Hardness 1210 mg/L as $CaCO_3$

Total Extractable Metals

As 0.007 mg/L

Cd 0.297 mg/L

Cu <0.01 mg/L

Fe 109 mg/L

Pb 0.121 mg/L

Zn 181 mg/L

DATE: October 29, 1990

CLIENT: Abandoned Mines

FIELD ID: Dacotah Lower Dump--08/15/90

LAB NO: S2709

DATE RECEIVED: 09-24-90

Unknown location

pH (1:1 slurry) 2.19 SU

Total Metals

As 163 mg/Kg

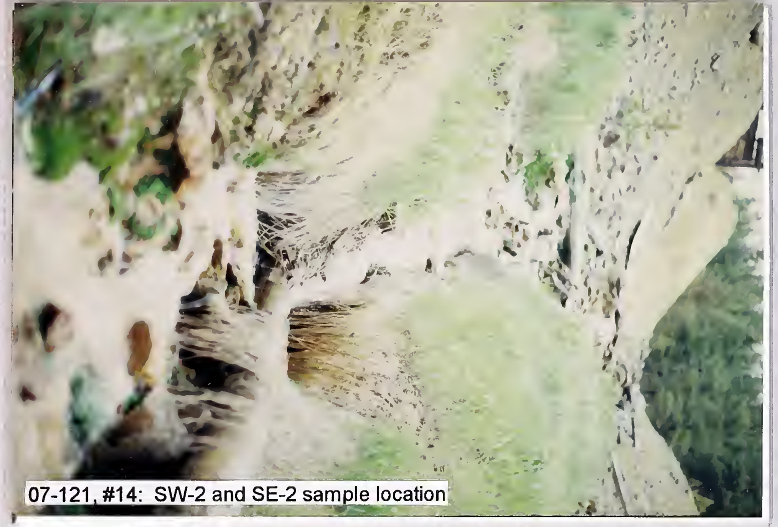
Cd <1 mg/Kg

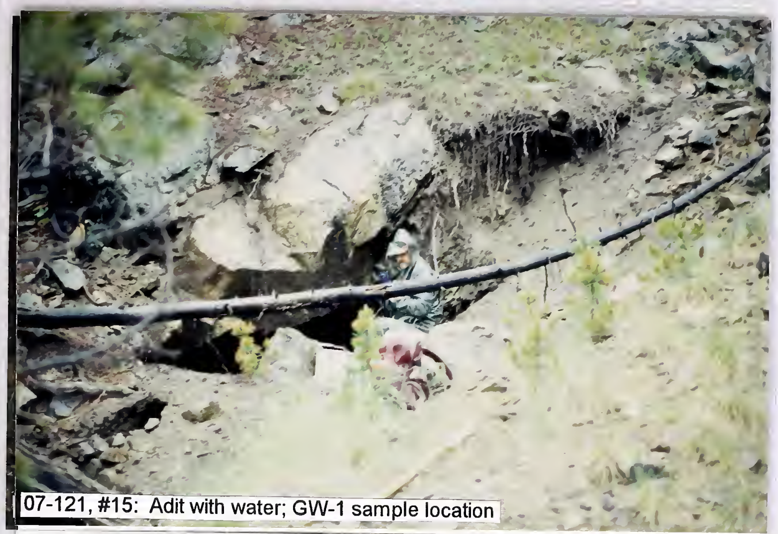
Cu 3 mg/Kg

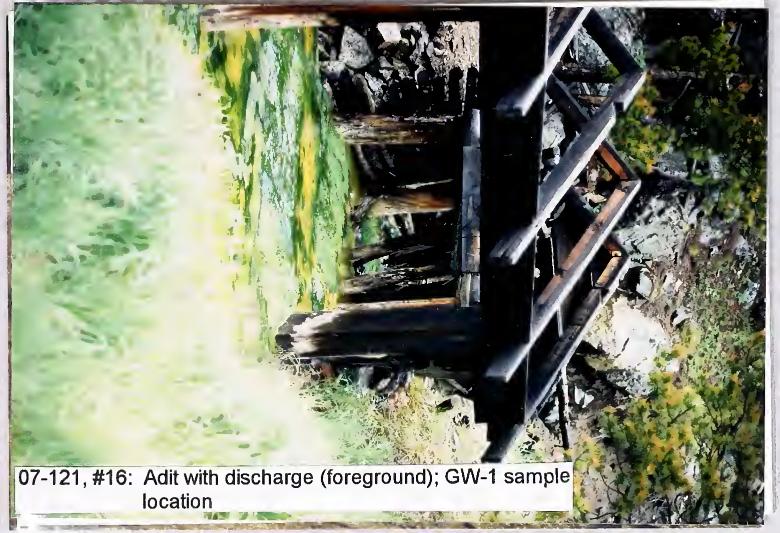
Fe 50.100 mg/Kg

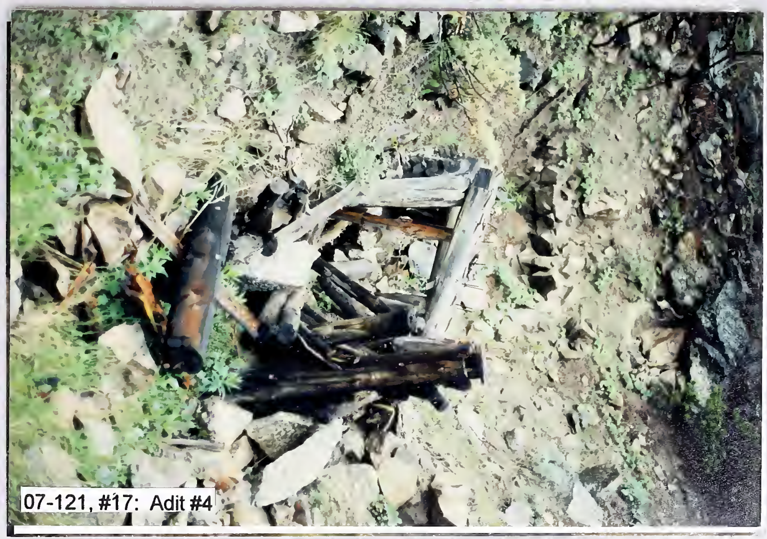
Pb 2840 mg/Kg

Zn 1790 mg/Kg

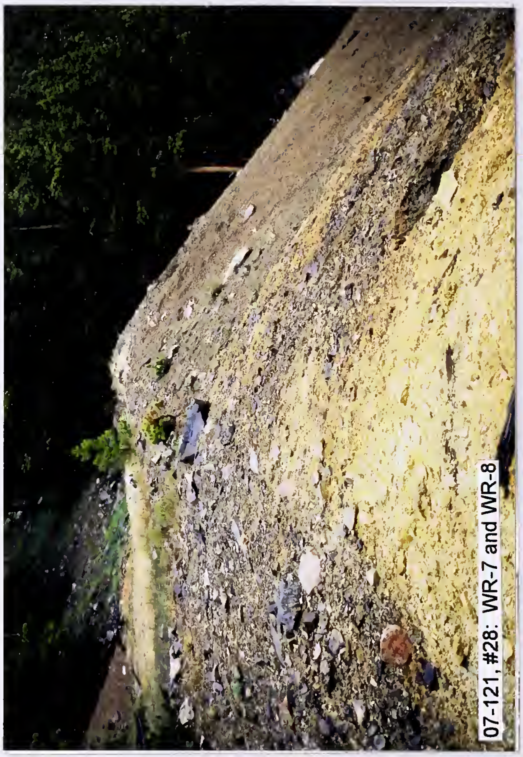

07-121, #14: SW-2 and SE-2 sample location


07-121, #15: Adit with water; GW-1 sample location


07-121, #16: Adit with discharge (foreground); GW-1 sample location


07-121, #17: Adit #4

07-121, #26: Adit #7



07-121, #28: WR-7 and WR-8

07-121, #18: SW-1 and SE-1 sample location

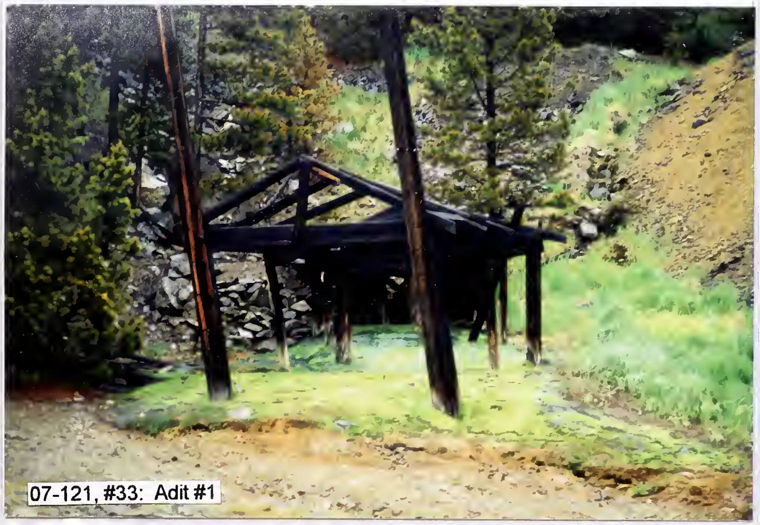
07-121, #27: Adit #8

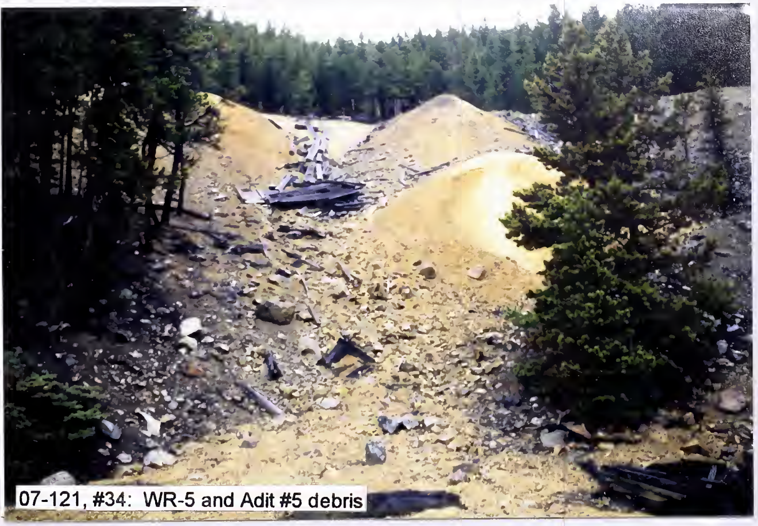
07-121, #29: Adit #7

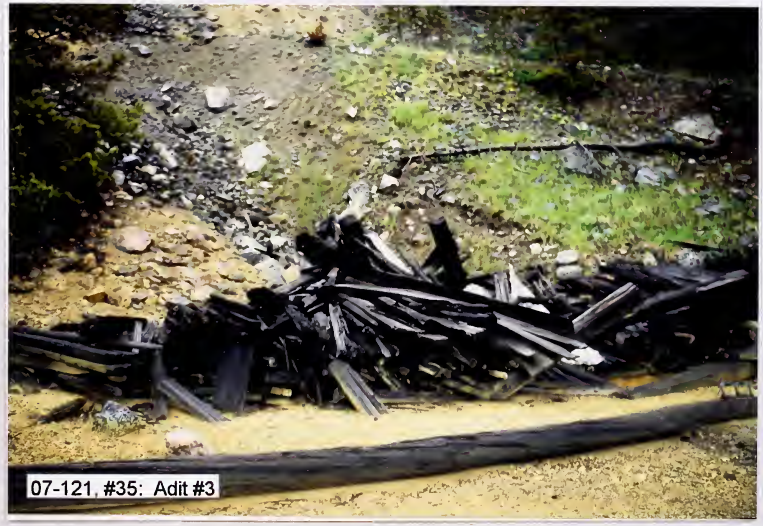
07-121, #30: WR-7 and WR-8

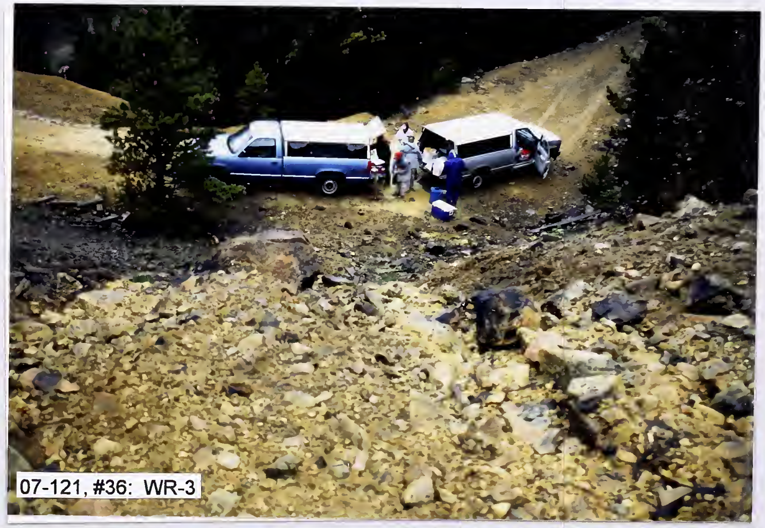
07-121, #31: WR-1

07-121, #32: WR-1 and Rock Creek


07-121, #33: Adit #1


07-121, #34: WR-5 and Adit #5 debris


07-121, #35: Adit #3


07-121, #36: WR-3

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: MAUD S. PA#: 07-129

Date: June 9, 1993 Time: 0830

Field Team Leader: Babits, Pioneer

Sampling Personnel: Flammang, Pioneer

Visitors: None

Weather/Seasonality Observations: Cool; no breeze; steady rain; cool, wet spring.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #11: Adit; #12: Waste rock. No video was taken.

General Comments/Observations (not covered specifically in attached Inventory Forms): Site is described in previous investigation well by Chen-Northern; however, bellows is not a significant feature.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Steep, large waste rock pile will be difficult to revegetate; would be possible to reprocess for silver content.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): MAUD S. PA#: 07-129

Legal Description: T 14N ;R 8E ;Sec. 28 , SW1/4 SW1/4 1/4

County: CASCADE Mining District: NEIHART

Latitude: N 46° 56' 25" Longitude: W 110° 43' 18"

Primary Drainage Basin and Code: Belt Creek/10030105
Secondary Drainage Basin: Rock Creek

USGS Quadrangle map name(s): Neihart

Mine Type/Commodities: Hardrock/Silver, Lead, Zinc

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Private/Public
Owner, Agent, or Contact(Include address and phone when available): Peter Antonioli, Alexandra Resources Co., P.O. Box 791, Butte, MT 59702. (406) 723-8730; Lewis and Clark National Forest.

Relationship to other mines/sites in the area/district: The Silver Belt mine is approx. 1/4 mile to the southeast.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 7000' , Slope 30° ,
Aspect Northwest

Land use: Mining___, Recreational X , Residential___, Urban___,
Agricultural___, Other(Specify)

Area of disturbed/unvegetated lands? Approx. .5 acres.
Dimensions:

Predominant vegetation types: Lodgepole pine, aspen

Access: roads - good___,poor X ,4wd___,trail X .
Other logistical considerations (proximity to other sites). One mile hike from the Dacotah mine.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 3 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Ore occurs in replacements along the contact of thin-bedded Madison Limestone and granite porphyry.

Mining/milling history, ore type/tenor, host rock, gangue: Host rock is pinto diorite and amphibolite-gneiss; vein deposit gangue is quartz. No other information available.

Mine Operation?
Shafts - Yes___, No X , # _____, Comment
Adits - Yes X , No___, # 1 , Comment Open with standing water
Pits - Yes___, No X , # _____, Comment
Placers - Yes___, No X , # _____, Comment
Other - Yes___, No X , # _____, Comment

Mill Operation? Yes____, No X . If yes answer the next three questions:

Period(s) of Operation: N/A

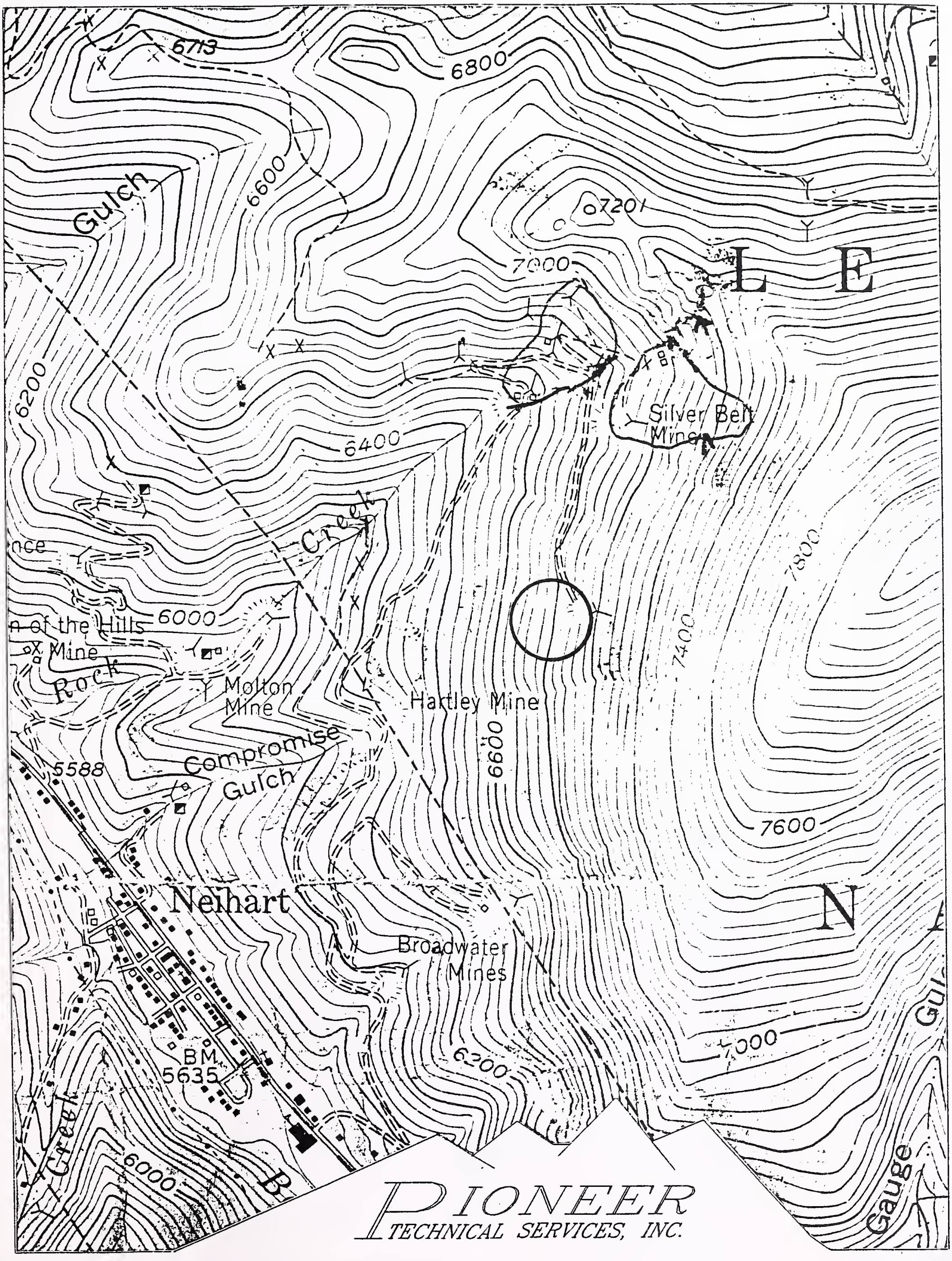
Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN^- leach (vat, heap), floatation, smelting?
N/A

10/22/1993

Montana Bureau of Mines and Geology
Water Well Log Data

[illegible]l No.	Location	Depth	Yield	Static Water Level
M:123062	14N 08E 20 DBA	41.0	4.0	24.00
M:123061	14N 08E 20 DBA	40.0	7.0	0.00
M:25649	14N 08E 32 BDC	120.0	8.0	7.00

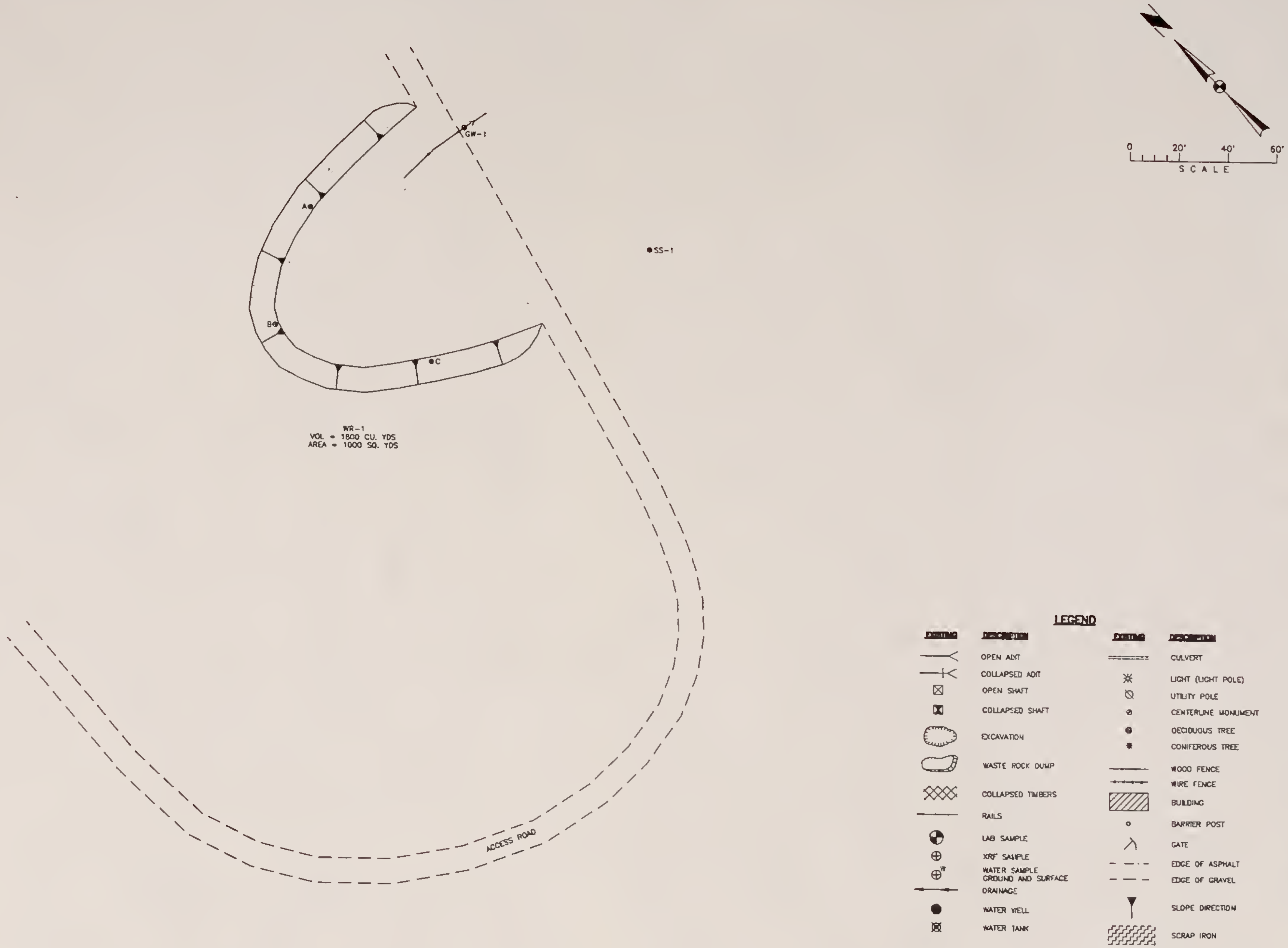


PIONEER
TECHNICAL SERVICES, INC.

MAUD S, P.A. NO. 07–129

T14N, R08E, SECTION 28

SCALE: 1" = 1000'



DRAWN MWC DATE 12/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

PIONEER TECHNICAL SERVICES, INC. BUTTE, MT

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

MAUD S. PA# 07-129
NEIHART DISTRICT CASCADE COUNTY

1

SHEET NO.
1

07-129.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Babits, Flammang

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	1,800	North side	None	5.4 (D)	NM	07-129-WR-1	06/08/93 0915	T-Metals, ABA
WR-1B	WR		West face	None	6.2 (D)	NM			
WR-1C	WR		South face	None	6.0 (D)	NM			
SS-1	BKGRND	N/A	Background soil approx. 150-200 feet above adit	N/A	6.8 (D)	NM	07-129-SS-1	06/08/93 0930	T-Metals, ABA

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 07-129-WR-1 is composite of WR-1A through -1C.
NM = Not Measured

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No_X_, Number:____ Identification:____________

Filled shafts: Yes___, No_X_, Number:____ Identification:____________

Seeps/Springs: Yes___, No_X_, Number:____ Identification:____________

Groundwater wells within 4 miles?: Yes_X_, No___;
Number of well logs:_13_

Distance to nearest well used for drinking?_Approx. 1 mile according to well log database._

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible_X_, Unlikely____.
Uncontained sources with elevated metals in adit discharge, but no surface expression of groundwater.

Other observations/notes:_N/A_

GROUNDWATER INVENTORY FORM

SAMPLERS: Babits, Flammang

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
GW-1	AD	Filled adit	N/A	6.51	107	318	2.8	5	N/A	07-129-GW-1	06/08/93 0840	T-Metals, TDS, Hardness, Cl-, SO4, NO2/NO3
GW-2	AD	QA/QC duplicate	N/A	6.51	107	318	2.8	5	N/A	07-129-GW-2	06/08/93 0850	T-Metals, TDS, Hardness, Cl-, SO4, NO2/NO3

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No X , Name(s):

Dry streambeds: Yes____, No X , Name(s):

Other surface water: Yes____, No X , Name(s)/Description:

Waste materials within any floodplain: Yes____, No X Source ID(s):

Approximate Flood frequency?___1 yr,___10 yr,___100 yr

Estimated seasonal flow of stream(s) (cfs)? N/A
High Flow:__________, Average Flow:__________

Distance between waste source(s) and nearest surface water body (ft)?
Approx. .5 mile to Rock Creek

Surface water draining onto or through waste sources: Yes____, No X ,
Describe: Only a runoff cut through tailings

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Fishery, irrigation, wetland

Observed erosional/sedimentation/stream turbidity problems? Yes____, No X , Distance downstream (ft)?________ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):

SURFACE WATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.											

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 0.5 acre

Wetlands present: Yes___, No X , Describe:

Carbonate rocks/soils: Yes X , No___, Describe: Very little carbonate precipitate

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X ; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? Approx. 1 mile (Neihart)

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Babits, Flammang

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH /MODERATE/LOW/NONE)
WR	None	Wet	9,000	9,000	Yes	High/Moderate

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes_____, No_X_,
Describe:____________________

Population within 1 mile: 1-10___; 10-30___; 30-100_X_; 100-300___;
300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments____________________

Evidence of recreational use on site: Yes___, No_X_, Describe:________

Accessibility - Fences, warning signs, closed roads?_Unrestricted_

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment________
Wilderness Area - Yes___, No_X_, Comment________
T&E Species Habitat - Yes___, No_X_, Comment________
Bat Habitat - Yes___, No_X_, Comment________

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High___, Medium_X_, Low___
Wetlands Frontage - High___, Medium___, Low_X_
Fisheries Habitat and Species Classification - _Not Rated_
Sport Fishery Classification - _Not Rated_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_1_, types and locations:___
One adit not flowing with unrestricted access.

Hazardous structures: Yes___, No_X_, Number____, types and locations:_

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____,
types and locations:____________________

Unstable waste piles, impoundments, undercut banks: Yes_X_, No____,
Number_1_, types and locations:_One waste dump experiencing sloughing._

Fire and/or Explosion hazards: Yes___, No_X_, Explain:________

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Maud S., Prepared by Chen-Northern, September 16, 1989.

USBM, Mines and Mineral Deposits (Except Fuels), Cascade County, Montana, Information Circular No. 7589, Written by Almon F. Robertson, April 1950.

USGS, Topographic Map, Neihart, Montana, 7 1/2 minute Quadrangle, 1961.

LABORATORY ANALYTICAL DATA

MAUD S.
PA NO. 07-129

Maud S. PA# 07-129
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BABITS
INVESTIGATION DATE: 06/08/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
07-129-WR-1	1380 J	526	35.9	17.9	27	159	55600	1.11	8290	55 J	7880	18 J	5610	NR
BACKGROUND	19 J	110	0.4 UJ	7.4	10.4	11	12000	0.142	320	10 J	138	3 UJ	115	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
07-129-WR-1	1.14	44	7.25	-36.	1.07	0.04	0.3	1.25	6

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
07-129-GW-1	1.61 U	19.5	42.6	5.99 U	5 U	22	89	0.14	2730	31.9	228	28.2	6260	31
07-129-GW-2	1.74	19.2	39.5	5.99 U	7.67	21.9	63.9	0.15	2710	33.3	222	30.2	6360	31.7

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
07-129-GW-1	64	< 5.0	43	0.11	NR
07-129--GW-2	51	< 5.0	40	0.12	NR

LEGEND

WR1 - Composite of subsamples WR1A, 1B, and 1C.
BACKGROUND - Approx. 150-200 feet above adit.
From Maud S. Mine (07-129-SS-1).
GW1 - Filled adit.
GW2 - Duplicate of sample 07-129-GW-1.

XRF ANALYSIS RESULTS

MAUD S.
PA NO. 07-129

Mine Name: Maud S. PA# 07-129
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
07-129-WR1-A		26977.4	5312.23	4288.02		7622.79	50568.3		81.5109 *	2753.18		81.6079
07-129-WR1-B		34621.1	6522.74	3216.06		690.954 *	69489.9		161.143 *	2186.17	1414.22	107.312
07-129-WR1-C	585.231 *	36029.5	2965.54	3808.78		1200.08 *	52994.9	504.864 *	223.558 *	3136.34		52.4522
07-129-WR-1-COMP		37460.8	5136.67	3774.94		3374.39	63235	649.174 *	135.025 *	2730.85	493.318 *	75.541

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
07-129-WR1-A	141.847			4343.65	167.699		44.3585 *	554.581	405.574		
07-129-WR1-B	178.109			4721.14	159.709		56.5571 *	582.257	224.683 *		
07-129-WR1-C	160.542			7568.06	213.621		52.0885 *	434.749	533.159		
07-129-WR-1-COMP	169.102			6825.26	190.946		68.4033 *	572.821	393.748		

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

MAUD S.
PA NO. 07-129

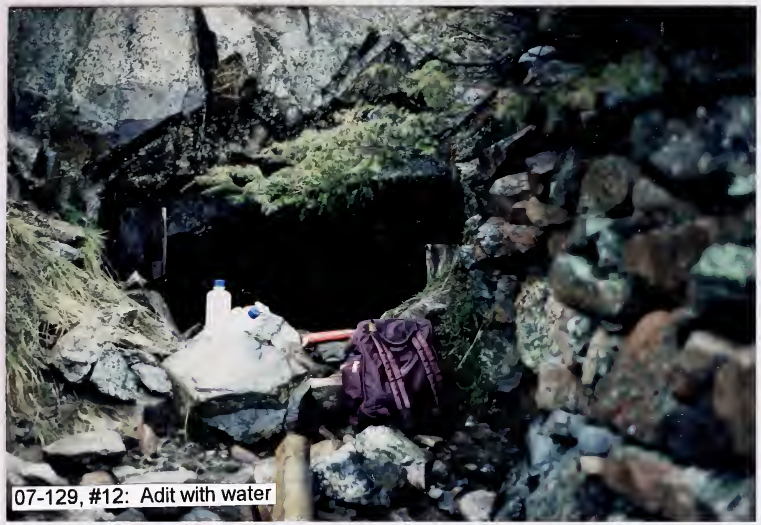
AIMSS SCORESHEET

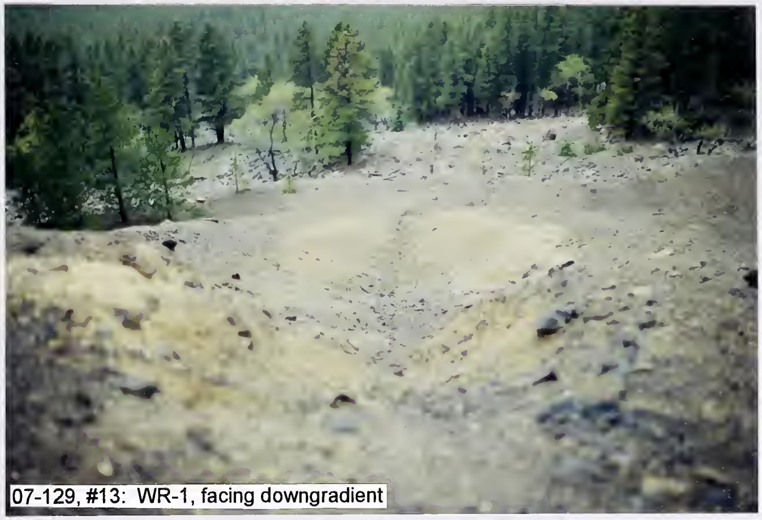
SITE NAME: MAUD S.
PA NUMBER: 07-129

LINE NO.				
		GROUNDWATER PATHWAY		
1		OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A	GW - LIKELIHOOD OF RELEASE	CONTAINMENT		20
3B		GW DEPTH		10
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	200
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	200
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	9.222
6		WELLS - 1 MI. x 2.5		7.5
7	GW - TARGETS	WELLS - 1 TO 4 MI		10
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	17.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	32277
		SURFACE WATER PATHWAY		
11		OBSERVED RELEASE		0
12	SW - LIKELIHOOD OF RELEASE	EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		2
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	40
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	40
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	10.053
16		DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19	SW - TARGETS	FISHERY		0
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 - 22	17
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	6836
		AIR PATHWAY		
25		OBSERVED RELEASE		0
26A	AIR - LIKELIHOOD OF RELEASE	CONTAINMENT		20
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	100
27		LIKELIHOOD SCORE	LINES 25 + 26C	100
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.101
29		POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		0
31	AIR - TARGETS	WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 - 33	30
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	303
		DIRECT CONTACT PATHWAY		
36		OBSERVED EXPOSURE		0
37A	LIKELIHOOD OF EXPOSURE	ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	100
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.092
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		30
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 - 42	30
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	276
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**0.40**

SITE NAME: MAUD S.
PA NUMBER: 07-129

LINE NO.		SITE SAFETY		
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	50
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 - 7	50
9		POPULATION - 1 MILE		30
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 - 11	30
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**30.00**


07-129, #12: Adit with water


07-129, #13: WR-1, facing downgradient

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: NEIHART TAILINGS **PA#:** 07-134

Date: June 2, 1993 **Time:** 0715

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Flammang, Pioneer
Clark, Pioneer

Visitors: None

Weather/Seasonality Observations: Cool; cloudy, intermittent rain.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #13: SW-1 and SE-1 sample locations, facing west; #14: SE-2 sample location, facing north; #15: TP-1-1, facing south; #16: TP-1-2, facing south; #17: TP-1-3, facing north; #18: TP-1-4, facing south; #19: TP-1-5, facing northwest. Video Tape No. 2

General Comments/Observations (not covered specifically in attached Inventory Forms): N/A

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Isolate tailings from alluvial aquifer and Belt Creek, if applicable; cap, revegetate, and cover.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): NEIHART TAILINGS PA#: 07-134

Legal Description: T 14N ;R 8E ;Sec. 29 , SW1/4 SW1/4 ___1/4

County: CASCADE Mining District: NEIHART

Latitude: N 46° 56' 30" Longitude: W 110° 44' 40"

Primary Drainage Basin and Code: Belt Creek/10030105
Secondary Drainage Basin: Belt Creek

USGS Quadrangle map name(s): Neihart

Mine Type/Commodities: Mill Tailings Pond

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Private/Public
Owner, Agent, or Contact(Include address and phone when available): Richard Bennett, Monarch Co. Inc., P.O. Box 2267, Great Falls, MT 59403. (406) 452-6933; Lewis and Clark National Forest.

Relationship to other mines/sites in the area/district: Unknown

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? Riprap along Belt Creek installed in the 1970's by MDT.

General site features: Elevation 5747' , Slope 2° ,
Aspect Northeast

Land use: Mining___, Recreational X , Residential X , Urban___,
Agricultural___, Other(Specify)

Area of disturbed/unvegetated lands? Approx. 1.6 acres.
Dimensions: 413 feet x 180 feet

Predominant vegetation types: Cottonwood, Lodgepole pine, willow, some grasses

Access: roads - good X ,poor___,4wd___,trail___.
Other logistical considerations (proximity to other sites). On U.S. 89

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 3 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies on the southwest side of the perennial Belt Creek. Belt Creek flows northwest past the site and is the major drainage for the area. Site is underlain by alluvium and pre-beltian gneiss and schist.

Mining/milling history, ore type/tenor, host rock, gangue: No information available; possibly from the Queen of the Hills Mill.

Mine Operation?

Shafts - Yes___, No X, # ___, Comment
Adits - Yes___, No X, # ___, Comment
Pits - Yes___, No X, # ___, Comment
Placers - Yes___, No X, # ___, Comment
Other - Yes___, No X, # ___, Comment

Mill Operation? Yes X, No___. If yes answer the next three questions:

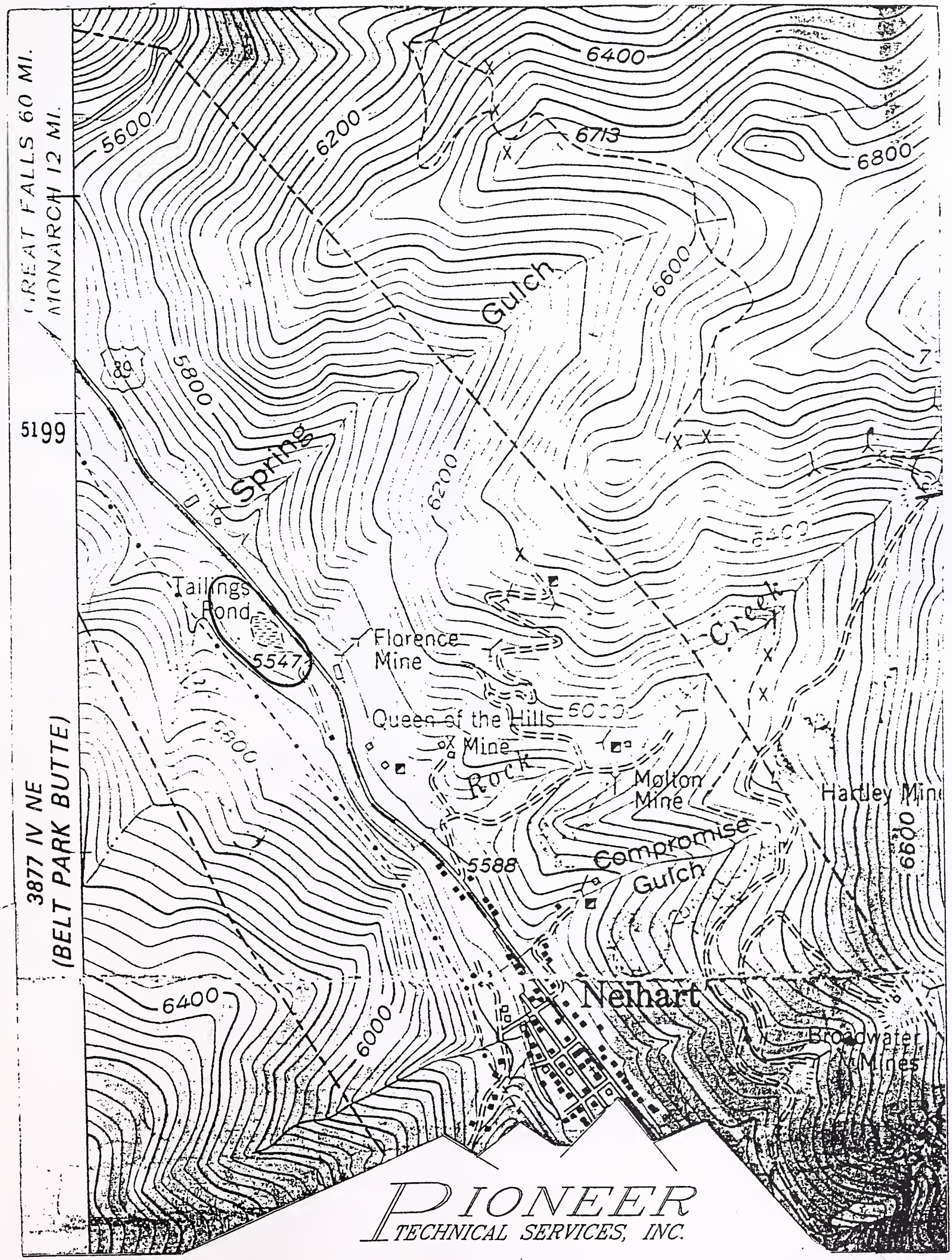
Period(s) of Operation: Unknown

Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: Unknown

Process? Hg-amalgam, CN$^-$ leach (vat, heap), floatation, smelting? Unknown

Montana Bureau of Mines and Geology 10/22/1993
Water Well Log Data

Well No.	Location	Depth	Yield	Static Water Level
M:123062	14N 08E 20 DBA	41.0	4.0	24.00
M:123061	14N 08E 20 DBA	40.0	7.0	0.00
M:25649	14N 08E 32 BDC	120.0	8.0	7.00

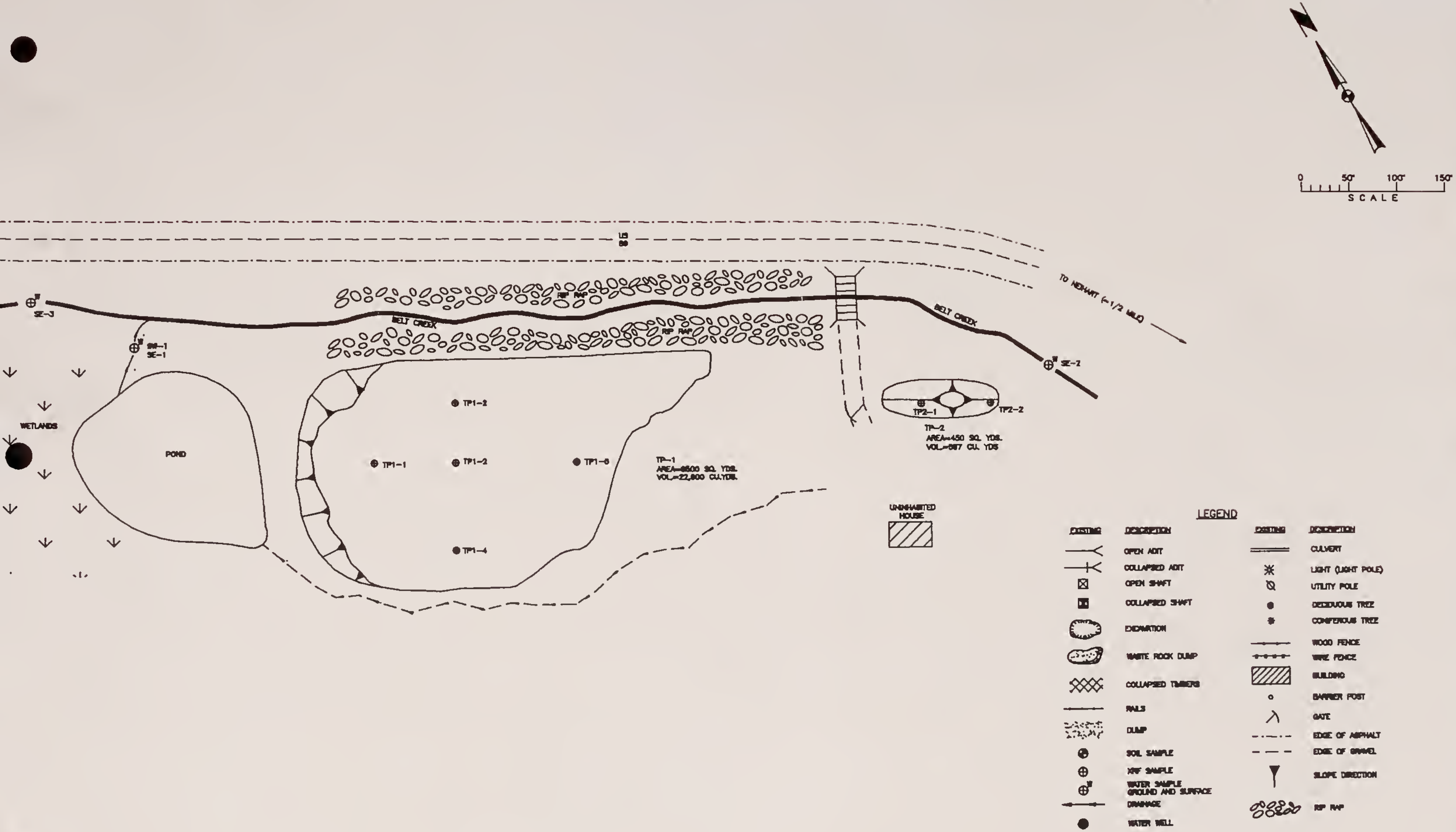


PIONEER
TECHNICAL SERVICES, INC.

NEIHART TAILINGS, P.A. NO. 07-134

T14N, R08E, SECTION 29

SCALE: 1" = 1000'



DRAWN MWC DATE 8/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

PIONEER TECHNICAL SERVICES, INC. BUTTE, MT.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

NEIHART TAILING PA# 07-134
NEIHART DISTRICT CASCADE COUNTY

SHEET NO.

07-134.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): Silty sand to fine clay

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): Oxidation zone 12"-18" bgs, orange/tan color; gray tailings in reduced zone to depths of 8' bgs.

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): Moist at surface in some areas from precipitation; near saturation in clay pearched zone. Sandy underlying tails are damp, but not saturated.

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): Riprap along Belt Creek in good condition; no containment on TP-2.

Comments on potential for mitigation: Relatively small volume for removal. Possible deep tilling/vegetation or capping due to apparent lack of connection with groundwater.

SOURCE INVENTORY FORM

SAMPLERS: Bullock, Flammang

SOURCE I.D. NO.	SOURCE TYPE	SOURCE SIZE/ VOLUME	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
TP-1-1A	TAIL	22,500	Northwest end of TP-1; 0-0.5', red silty sand	Fair	4.78 (S)	0.05	07-134-TP-1-1	06/02/93 1300	T-Metals, ABA, CN-
TP-1-1B	TAIL		Northwest end of TP-1; 0.5-1', brown silt	Fair	3.9 (D)	0.04			
TP-1-2A	TAIL		Center of pond; 0-1.5', brown sand	Fair	5.79 (S)	0.03	07-134-TP-1-2	06/02/93 1315	T-Metals, ABA, CN-
TP-1-2B	TAIL		Center of pond; 1.5-3.5', red silty clay	Fair	< 3.5 (D)	0.04			
TP-1-3	TAIL		North-northeast along Belt Creek; 0-3.5'	Fair	NM	NM			
TP-1-4	TAIL		South-southwest near diversion; 2.5-7', gray clay	Fair	3.6 (D)	0.04			
TP-1-5	TAIL		South-southeast end nearest to bridge; 3.4-8'	Fair	< 3.5 (D)	0.04			
TP-2-1A	TAIL or CONC	600	Small pile east of main pond, west side; 0-3.5'	None	< 3.5 (D)	0.06	07-134-TP-2-1	06/02/93	T-Metals, ABA, CN-
TP-2-1B	TAIL or CONC		Small pile east of main pond, west side; 3.5-4', tan clay	None	< 3.5 (D)	0.06			
TP-2-1C	TAIL or CONC		Small pile east of main pond, west side; 4-6.5', orange sand	None	< 3.5 (D)	0.04			
TP-2-2A	TAIL or CONC		Small pile, east end; 0-3.5'	None	< 3.5 (D)	0.04			
TP-2-2B	TAIL or CONC		Small pile, east end; underlying soil	None	< 3.5 (D)	0.04			

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 07-134-TP-1-1 is composite of oxidized zones from all holes 1-5 in TP-1. 07-134-TP-2-2 is composite of reduced zones from all holes 1-5 in TP-1. 07-134-TP-2 is composite of all of TP-2-1 and all of TP-2-2.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No X , Number:____ Identification:____

Filled shafts: Yes___, No X , Number:____ Identification:____

Seeps/Springs: Yes X , No____, Number: 1 Identification: Seep in diversion ditch on west side of tailings which flows into pond; the outlet was sampled as SW-1.

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 13

Distance to nearest well used for drinking? Approx. 100' upgradient

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable X , Possible____, Unlikely____.
Although tailings do not appear to be in contact with groundwater, infiltration of precipitation is highly probable.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: ______________________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______________________________

____

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X , No ___, Name(s): Belt Creek

Dry streambeds: Yes ___, No X , Name(s): ___

Other surface water: Yes X , No ___, Name(s)/Description: Diversion ditch and settling pond along the southwest side of the site

Waste materials within any floodplain: Yes X , No ___ Source ID(s): TP-1

Approximate Flood frequency? ___1 yr, ___10 yr, X 100 yr

Estimated seasonal flow of stream(s) (cfs)? ___
High Flow: 100+ cfs , Average Flow: 15-20 cfs

Distance between waste source(s) and nearest surface water body (ft)? 20 feet between exposed waste and Belt Creek.

Surface water draining onto or through waste sources: Yes X , No ___,
Describe: Diversion ditch has some tails washed into it.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Irrigation, T&E - Bald Eagles, possible limited fishery

Observed erosional/sedimentation/stream turbidity problems? Yes X ,
No ___, Distance downstream (ft)? 50 Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
Some sedimentation in the diversion ditch.

SURFACE WATER INVENTORY FORM

SAMPLERS: Bullock, Clark

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	Outlet to Belt Creek of settling pond associated with diversion ditch	6.03	160	315	47°F	36	200 gpm (E)	07-134-SW-1	06/02/93 1345	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3, CN-
SE-1	SE	Outlet to Belt Creek of settling pond associated with diversion ditch	N/A	N/A	N/A	N/A	N/A	200 gpm (E)	07-134-SE-1	06/02/93 1345	T-Metals, CN-
SE-2	SE	Upradient Belt Creek tailings	N/A	N/A	N/A	N/A	N/A	100 cfs (E)	07-134-SE-2	06/02/93 1415	T-Metals, CN-
SE-3	SE	Downgradient Belt Creek tailings	N/A	N/A	N/A	N/A	N/A	100 cfs (E)	07-134-SE-3	06/02/93 1400	T-Metals, CN-

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? Approx. 0.5 acre at northwest end

Wetlands present: Yes X, No ___, Describe: Around and northwest of settling pond (approx. 0.5 acre)

Carbonate rocks/soils: Yes ___, No X, Describe: None apparent

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments___

Nearest residence(ft or miles)? 50' - part-time, not recently

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
TP-1	ESD in summer; FEOX; SO3; pH	Partial	76,500	70,000	Yes	Moderate when dry
TP-2	FEOX; SO3; pH	Partial	4,000	4,000	Yes	Moderate

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes_X_, No____,
Describe: Part-time residents

Population within 1 mile: 1-10___; 10-30___; 30-100_X_; 100-300___;
300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments____

Evidence of recreational use on site: Yes___, No_X_, Describe:____

Accessibility - Fences, warning signs, closed roads? Cable gate at bridge

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment____
Wilderness Area - Yes___, No_X_, Comment____
T&E Species Habitat - Yes___, No_X_, Comment____
Bat Habitat - Yes___, No_X_, Comment____

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High_X_, Medium___, Low___
Wetlands Frontage - High___, Medium_X_, Low___
Fisheries Habitat and Species Classification - _3_
Sport Fishery Classification - _3_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes___, No_X_, Number____, types and locations:____

Hazardous structures: Yes___, No_X_, Number____, types and locations:____

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____,
types and locations:____

Unstable waste piles, impoundments, undercut banks: Yes_X_, No____,
Number_1_, types and locations: TP-2 is eroding into Belt Creek.

Fire and/or Explosion hazards: Yes___, No_X_, Explain:____

Bibliography

MBMG, Geology and Ore Deposits of the Neihart Mining District, Cascade County, Montana, Memoir 13, Written by Paul A. Schafer, July 1935.

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB, Environmental Assessment Analytical Data for Neihart Tailings, Prepared by MSE, Inc., October 4 and 29, 1990.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Neihart Tailings, Prepared by Chen-Northern, September 12, 1989.

USGS, Topographic Map, Neihart, Montana, 7 1/2 minute Quadrangle, 1961.

LABORATORY ANALYTICAL DATA

NEIHART TAILINGS
PA NO. 07-134

Neihart Tailings PA# 07-134
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BULLOCK
INVESTIGATION DATE: 06/02/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
07-134-SE-1	27.2	2440	93.1	11.5	15.5	67.7	17100	0.105 U	71500	488	1060	26.2 J	22800	2.277
07-134-SE-2	8	224	1.0	9.33	18.8	14.1	18400	0.082	865	26.9	327	3.93 UJ	528	1.289 U
07-134-SE-3	29.2	600	3.8	9.02	16	29.8	20100	0.049 U	2240	29.7	792	2.87 UJ	1170	1.227 U
07-134-TP-1-1	190	1630	47.4	3.96	7.31	223	33100	0.118	11100	63.4	10100	10.8 J	11400	1.213 U
07-134-TP-1-2	284	984	63.1	17.8	15.3	371	38300	0.121	20700	151	11400	17.4 J	14000	1.283 U
07-134-TP-2	234	38.7	40.7	5.4	4.22	62.7	53600	0.060 U	707	9.14	37400	10.1 J	10400	1.2 U
BACKGROUND	53.3	828	15.3	11.6	72.7	50.1	30600	0.051 U	10400	91.5	5110	2.99 UJ	3530	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
07-134-TP1-1	1.64	51.2	17.7	-33.	0.56	0.55	0.53	17.2	0.54
07-134-TP1-2DUP	3.39	106	26.5	-79.	0.15	2.07	1.17	64.7	-38.2
07-134-TP1-2	3.37	105	26.3	-79	0.16	2.04	1.17	63.7	-37.4
07-134-TP-2	4.94	154	-9.0	-163	2.44	0.86	1.64	26.9	-35.9
07-134-TP-2DUP	4.96	155	-9.2	-164	2.45	0.88	1.63	27.5	-36.8

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
07-134-SW-1	0.98 U	41.6	3	5.99 U	5 U	8.9 J	223	0.038 U	660	16	12.1	18.3 U	1580 JX	57.3

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
07-134-SW-1	86	< 5.0	28	< 0.05	0.01

LEGEND

SE1 - Same as sample SW1.
SE2 - Upgradient Belt Creek Tailings.
SE3 - Downgradient of Belt Creek Tailings.
TP1-1 - Composite of oxidized zone; from holes 2-5 in tailings pond 1.
TP1-2 - Composite of TP2-1all and TP2-2all.
TP2 - Composite of reduced zone; from holes 2-5 in tailings pond 1.
BACKGROUND - From Compromise (07-1000-SS-1).
TP1-2DUP - Duplicate of sample 07-134-TP1-2.
TP2DUP - Duplicate of sample 07-134-TP-2.
SW1 - Outlet of Belt Creek of Belt Creek of settling pond associated with diversion ditch.

XRF ANALYSIS RESULTS

NEIHART TAILINGS
PA NO. 07-134

Mine Name: Neihart Tailings PA# 07-134
XRF Field Analyses
Results in PPM

XRF SAMPLE iD	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
07-134-SE-1		10342.2	4366.36	1111.51	130.322 *	25956.6	18417			5824.68		165.742
07-134-SE-2		10666	3618.86	1158.69		1137.64 *	18062	410.655 *		343.485		201.479
07-134-SE-3		8856.75	4028.65	2228.78	160.242 *	2715.94	30959.5	452.086 *		628.402		224.02
07-134-TP1-1A		17526.1	2761.91	1540.42		11825	27598.9		93.2186 *	4661.87		215.295
07-134-TP1-1B		17715.5	3178.02	1707.04		3259.86	25933.4			1406.99		200.792
07-134-TP1-1-COMP		18449.3	1954.04	1128.5	167.854 *	8810.79	29274.5		98.5855 *	5193.91		159.287
07-134-TP1-2A	497.2 *	29452.3	3373.9	1985.1		13352.1	36772.5		227.858 *	8560.68		233.209
07-134-TP1-2B		31113.7	4206.1	1823.47	196.952 *	24681.5	35519.8		380.454	13337.5		267.048
07-134-TP1-2-COMP		28044	4122.96	1549.23	247.135 *	26183	33538.4		282.915 *	10824.4		238.429
07-134-TP1-4C		20044.7	3314.02	1545.45		23020.1	27245.2		93.5305 *	3073.03		172.379
07-134-TP1-5D		22556.6	3496.36	2242.86		2209.32	23300			3129.68		206.171
07-134-TP2-1A		41545.6	2021.73	3050.34			43224.1			2773.64		42.1034
07-134-TP2-1B		34006.6	9574.29	3710.16		759.031 *	40785.5			1677.27		40.7432 *
07-134-TP2-1C		36002	5866.09	3451.72		1145.68 *	63602.8			4278.18		52.5453 *
07-134-TP2-2A		36685	8435.12	3629.85		1834.39 *	70456.1	698.796 *		2669.44		58.6146
07-134-TP2-2B		12732.6	3595.36	2387.52	126.335 *		49914.8			467.675	252.823 *	209.871
07-134-TP-1-COMP		35799.4	4198.07	3883.57		934.398 *	57861.4	533.46 *		2767.61		53.4791

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
07-134-SE-1	151.698			457.703	71.7237			674.146			
07-134-SE-2	125.286			88.4863 *	96.5353			656.477			12.1925 *
07-134-SE-3	413.239			436.23	99.0925			4031.39	184.574 *		16.5392 *
07-134-TP1-1A	192.881			3848.11	92.0719			6631.17	168.969 *		17.8651 *
07-134-TP1-1B	242.88			164.577	104.226			685.336	80.277 *		10.4146 *
07-134-TP1-1-COMP	160.412			4717.24	94.7784		40.1191 *	6458.77	164.842 *		
07-134-TP1-2A	174.005			8298.58	147.568		65.0981 *	6657.73	262.665		
07-134-TP1-2B	150.255			9431.13	136.997	156.977 *	86.4293 *	10675.6	238.714 *		
07-134-TP1-2-COMP	152.267			7439.52	133.193	158.427 *	53.8013 *	10111.7	227.452 *		
07-134-TP1-4C	118.838			1738.32	104.965		56.4407 *	8481.64	135.025 *		
07-134-TP1-5D	285.209			50.0512 *	133.524			743.723	125.504 *	15.1292 *	15.3453 *
07-134-TP2-1A	125.744			2169.64	190.967			227.155	170.968 *		
07-134-TP2-1B	214.705			7331.63	200.773			201.685	175.552 *		
07-134-TP2-1C	156.532			13447.9	207.098			195.122	158.676 *		41.3637 *
07-134-TP2-2A	93.467			11748.8	222.093			339.04	159.339 *		28.6456 *
07-134-TP2-2B	213.641			353.976	85.3122			1048.12	100.312 *		
07-134-TP-1-COMP	125.185			5043.56	217.95			370.856	110.766 *		

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

NEIHART TAILINGS
PA NO. 07-134

AIMSS SCORESHEET

SITE NAME: NEIHART TAILINGS
PA NUMBER: 07-134

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	128.038
6	GW - TARGETS	WELLS - 1 MI. x 2.5		7.5
7		WELLS - 1 TO 4 MI		10
8		NEAREST WELL		10
9		TARGETS SCORE	LINES 6 + 7 + 8	27.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	1408418
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		300
12		EXCEEDENCES		50
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	750
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	140.720
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		5
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 - 22	22
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	2321880
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		15
26B		DISTANCE TO POPULATION		20
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	300
27		LIKELIHOOD SCORE	LINES 25 + 26C	300
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.927
29	AIR - TARGETS	POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		10
31		WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 - 33	50
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	13905
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		200
37A		ACCESSIBILITY		10
37B		DISTANCE TO POPULATION		20
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	200
38		LIKELIHOOD SCORE	LINES 36 + 37C	400
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.843
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		30
41		NEAREST RESIDENCE		10
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 - 42	40
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	13488
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE**	(LINES 10 + 24 + 35 + 44) / 100,000		**37.58**

SITE NAME: NEIHART TAILINGS
PA NUMBER: 07-134

LINE NO.		SITE SAFETY		
1	THREAT	ACCESSIBILITY		10
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 - 7	0
9		POPULATION - 1 MILE		30
10	TARGETS	NEAREST RESIDENCE		10
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 - 11	40
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**0.00**

SUMMARY OF HISTORICAL ANALYTICAL DATA FROM OTHER SOURCES

DATE: October 29, 1990

CLIENT: Abandoned Mines

FIELD ID: Neihart Tailings--08/16/90

LAB NO: S2698

DATE RECEIVED: 09-24-90

pH (1:1 slurry) 6.75 SU

Total Metals

As 239 mg/Kg

Cd 14 mg/Kg

Cu 132 mg/Kg

Fe 26,800 mg/Kg

Pb 7190 mg/Kg

Zn 5490 mg/Kg

REPORT DATE: October 4, 1990

CLIENT: Abandon Mines

FIELD ID: Neihart Tailings Downstream

LAB NO: W8568

DATE RECEIVED: 09-14-90

Hardness 67 mg/L as $CaCO_3$

Total Extractable Metals

As <0.001 mg/L

Cd <0.0001 mg/L

Cu <0.01 mg/L

Fe 0.02 mg/L

Pb <0.001 mg/L

Zn 0.07 mg/L

REPORT DATE: October 4, 1990

CLIENT: Abandon Mines

FIELD ID: Neihart Tailings Upstream

LAB NO: W8567

DATE RECEIVED: 09-14-90

Hardness 75 mg/L as $CaCO_3$

Total Extractable Metals

As 0.002 mg/L

Cd <0.0001 mg/L

Cu <0.01 mg/L

Fe 0.04 mg/L

Pb <0.001 mg/L

Zn 0.06 mg/L

07-134, #13: SW-1 and SE-1 sample location, facing west

07-134, #14: SE-2 sample location, facing north

07-134, #15: TP-1, facing south

07-134, #16: TP-1-2, facing south

07-134, #17: TP-1-3, facing north

07-134, #18: TP-1-4, facing south

07-134, #19: TP-1-5, facing northwest

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: SILVER DYKE ADIT **PA#:** 07-135

Date: June 1, 1993 **Time:** 0900-1700

Field Team Leader: Tuesday, Pioneer

Sampling Personnel: Belanger, Pioneer
Lasher, Pioneer

Visitors: None

Weather/Seasonality Observations: Light to heavy rain all day.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #1-#3: Glory hole above adit; #4: WR-1; #5: Adit discharge and WR-1 from below on road; #6: AMD on flat area below adit; #7: Adit and SW-1 locations; #8: SW-2 and SE-2 location below WR-2; #9: WR-2; #10: SW-3 and SE-3 location above road in Squaw Crk.; #11: SW-4 and SE-4 location in Squaw Crk. No video was taken.

General Comments/Observations (not covered specifically in attached Inventory Forms): AMD characteristics for 1 mile downstream in Squaw Crk. (FEOX); Abundant Cu minerals in WR-1.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Flowing adit collapsed; recharge from pit above. Divert adit flow around dump, then treatment. Move dump material into pit above; in conjunction with reclamation at Silver Dyke Millsite to south.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): SILVER DYKE ADIT PA#: 07-135

Legal Description: T 14N ;R 8E ;Sec. 10 , SE1/4 SW1/4 ___1/4

County: CASCADE Mining District: NEIHART

Latitude: N 46° 58' 57" Longitude: W 110° 41' 48"

Primary Drainage Basin and Code: Belt Creek/10030105
Secondary Drainage Basin: Squaw Creek

USGS Quadrangle map name(s): Neihart

Mine Type/Commodities: Hardrock/Silver, Lead, Zinc

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known Y X N__; private/public? Private/Public
Owner, Agent, or Contact(Include address and phone when available): Peter Antonioli, Alexandra Resources Co., P.O. Box 791, Butte, MT 59702. (406) 723-8730; Lewis and Clark National Forest.

Relationship to other mines/sites in the area/district: Near New Alicia and New Rodwell mine; adjacent to Silver Dyke Millsite.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 6900' , Slope 28° ,
Aspect Southwest

Land use: Mining___, Recreational X , Residential___, Urban___,
Agricultural X , Other(Specify)

Area of disturbed/unvegetated lands? 4 acres.
Dimensions: 300 feet x 600 feet

Predominant vegetation types: Lodgepole pine forest

Access: roads - good___,poor___,4wd X ,trail___.
Other logistical considerations (proximity to other sites).

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are no well logs in the MBMG well log database within a 1 mile radius. However, a residence in the drainage (1,000 feet southwest) has a 260 feet deep well with good quality water.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies in the intermittent Squaw Creek drainage near the top. Water flows southwest away from the site. Squaw Creek has its confluence approx. 3/4 mile below the mine with perennial Carpenter Creek. Adit provides perennial flow to Squaw Creek.

Mining/milling history, ore type/tenor, host rock, gangue: The deposit was first developed in 1921 with heavy mining until 1929. Glory hole was mined with ore being delivered to the adit below; an adit was driven below in 1926-27 with 700 tons/day being mined. A 500-ton concentrating mill was constructed in 1920's, increased its capacity to 950-tons. Production from 1921 to 1948 inclusive was 1,167,125 tons of ore from which 1,736.67 oz. Au, 3,177,068 oz. Ag, 7,453,527 lbs. Cu, 16,367,760 lbs. Pb, and 8,428 lbs. Zn was recovered. Ore was a complex mixture of both sulfide and oxide or carbonate minerals disseminated in a gangue of highly altered quartz porphyry and gneiss. Minerals present were galena, cerussite, pyrite, chalcopyrite, malachite, azurite, iron oxides and small amounts of sphalerite.

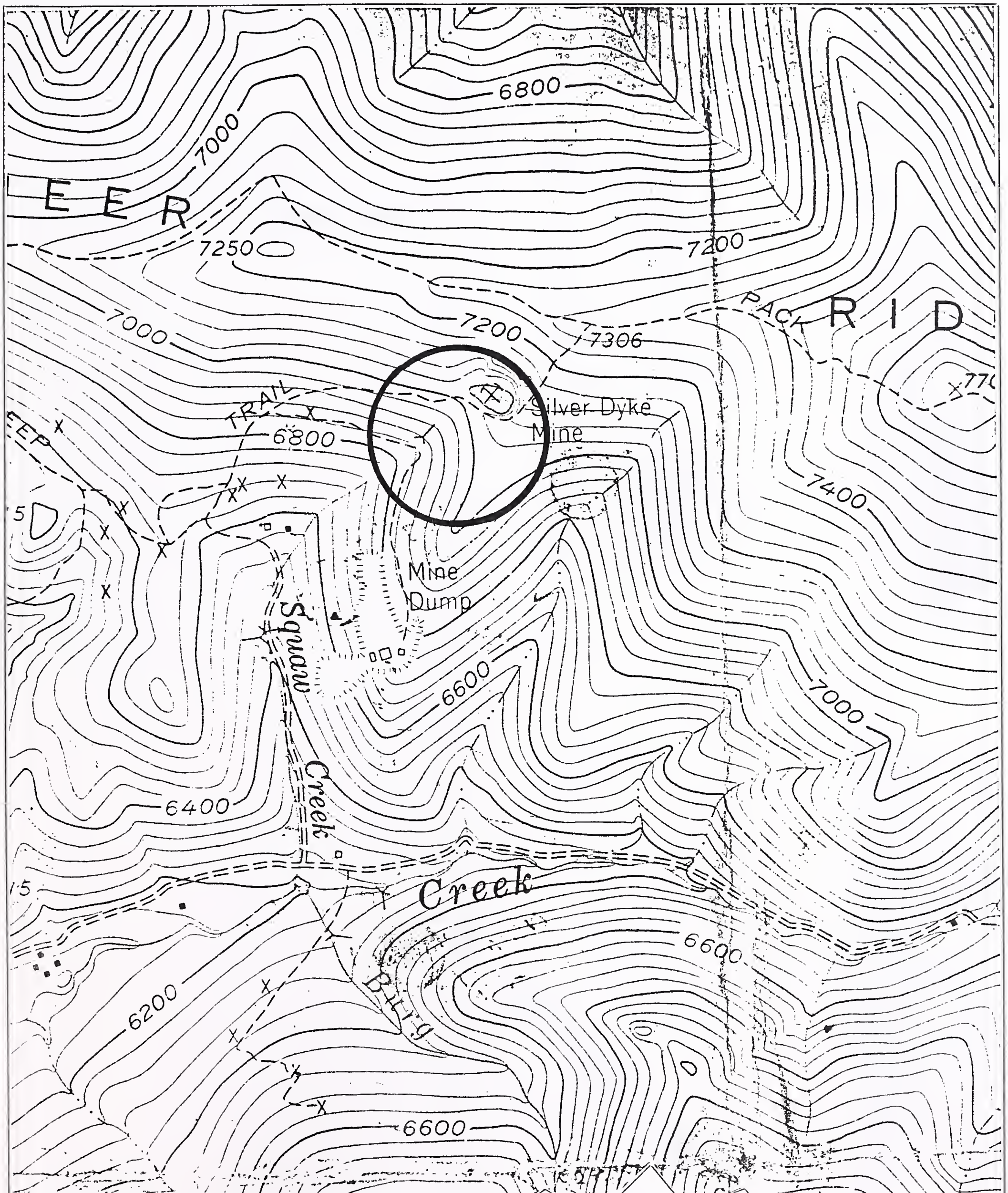
Mine Operation?
Shafts - Yes___, No X , # ___, Comment___
Adits - Yes X , No___, # 1 , Comment Caved with flow
Pits - Yes X , No___, # 1 , Comment Glory hole above adit
Placers - Yes___, No X , # ___, Comment___
Other - Yes___, No X , # ___, Comment___

Mill Operation? Yes X , No___. If yes answer the next three questions:

Period(s) of Operation: Constructed in 1922 to April of 1929; not on-site, see Silver Dyke Mill (07-138).

Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: Unknown

Process? Hg-amalgam, CN^- leach (vat, heap), floatation, smelting? Pb concentrate and Cu concentrate produced by floatation.

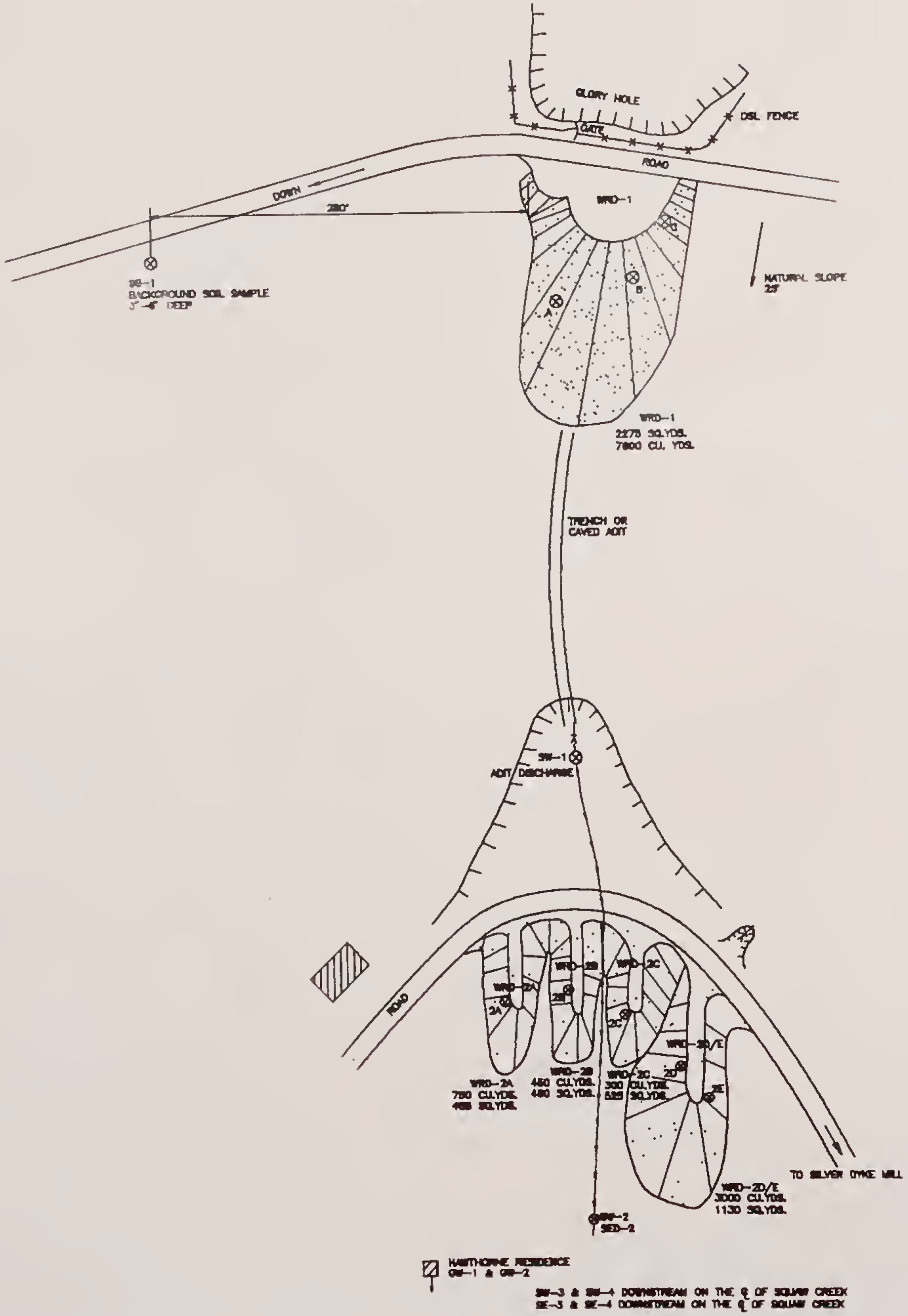


PIONEER
TECHNICAL SERVICES, INC.

SILVER DYKE ADIT, P.A. NO. 07-135

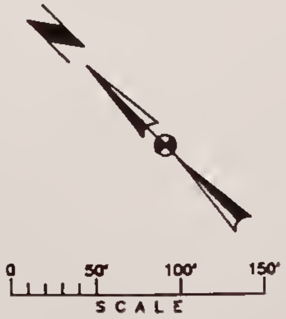
T14N, R08E, SECTION 10

SCALE: 1" = 1000'



LEGEND

EXISTING	DESCRIPTION	EXISTING	DESCRIPTION
═══	CULVERT	—<	OPEN ADIT
✳	LIGHT (LIGHT POLE)	—+<	COLLAPSED ADIT
⌀	UTILITY POLE	⊠	OPEN SHAFT
●	CENTERLINE MONUMENT	■	COLLAPSED SHAFT
●	DECIDUOUS TREE	⬭	EXCAVATION
✸	CONIFEROUS TREE	⬭	WASTE ROCK DUMP
———	WOOD FENCE	✕✕✕	COLLAPSED TIMBERS
—x—x—	WIRE FENCE	—+—+—	RAILS
▨	BUILDING	⊕	SOIL SAMPLE
○	BARRIER POST	⊕	XRF SAMPLE
⋀	GATE	⊕ W	WATER SAMPLE GROUND AND SURFACE
—·—·—	EDGE OF ASPHALT	—◆—◆—	DRAINAGE
— — —	EDGE OF GRAVEL	●	WATER WELL
▼	SLOPE DIRECTION		



PIONEER TECHNICAL SERVICES, INC. BUTTE, MT.

TD&H

DRAWN JTP DATE 24 JUNE 93
DESIGNED TPR JOB NO. 93-17
APPROVED ___ F.B. NO. ___

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY
SILVER DYKE ADIT PA# 07-135
NEIHART DISTRICT CASCADE COUNTY

SHEET NO.

07-135.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Tuesday, Belanger

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	7,600	West side of lobe approx. 1/2 way down	None	4.1 (D)	0.04	07-135-WR-1	06/01/93 1100	T-Metals, ABA
WR-1B	WR		Off knob of WR-1	None	3.5 (D)	0.07			
WR-1C	WR		Eastern side of WR-1	None	4.8 (D)	0.04			
WR-2A	WR	750	Western side of WR-2 by tracks	None	< 3.5 (D)	0.05	07-135-WR-2	06/01/93 1100	T-Metals, ABA
WR-2B	WR	450	Western side of second lobe in from west	None	3.5 (D)	0.04			
WR-2C	WR	300	Off knob of third lobe from west	None	< 3.5 (D)	0.07			
WR-2D	WR	3,000	West side of eastern lobe	None	3.9 (D)	0.04			
WR-2E	WR		East side of eastern lobe	None	< 3.5 (D)	0.07			
SS-1	BKGRND	N/A	Background soil 280 feet west of WR-1	N/A	N/A	N/A	07-135-SS-1	06/01/93 1115	T-Metals

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 07-135-WR-1 is composite of WR-1A, -1B, and -1C. 07-135-WR-2 is composite of WR-2A through E.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map o. topographic map.

Flowing adits: Yes X , No ___, Number: 1 Identification: SW-1

Filled shafts: Yes ___, No X , Number: ___ Identification: ___

Seeps/Springs: Yes ___, No X , Number: ___ Identification: ___

Groundwater wells within 4 miles?: Yes X , No ___;
Number of well logs: 12

Distance to nearest well used for drinking? 1,000 feet to the Hawthorne residence.

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite ___, Probable X , Possible ___, Unlikely ___.
Abundant sulfides; no carbonates; a lot of water with a honeycomb of workings.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: Tuesday

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
GW-1	RW	Glen Hawthorne residence	N/A	7.43	230	NM	9.1	43	260	07-135-GW-1	06/01/93 1620	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
GW-2	RW	Duplicate of residential well	N/A	7.43	230	NM	9.1	43	260	07-135-GW-1	06/01/93 1620	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SW-1	AD	Adit discharge	1 cfs (E)	5.12	2450	NM	8.2	8.6	N/A	07-135-SW-1	06/01/93 1230	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): No Eh Probe available for measurement.

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X, No ___, Name(s): Squaw Creek

Dry streambeds: Yes ___, No X, Name(s): ___

Other surface water: Yes ___, No X, Name(s)/Description: ___

Waste materials within any floodplain: Yes X, No ___ Source ID(s): WR-2

Approximate Flood frequency? X 1 yr, ___ 10 yr, ___ 100 yr

Estimated seasonal flow of stream(s) (cfs)? 2 cfs
High Flow: 5 cfs, Average Flow: 1 cfs

Distance between waste source(s) and nearest surface water body (ft)? Stream flows over dumps.

Surface water draining onto or through waste sources: Yes X, No ___,
Describe: Adit discharge flows over WR-2 and becomes Squaw Creek.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Possible wetland on Carpenter Creek approx. 1 mile downstream.
Belt Creek has fishery and recreation.

Observed erosional/sedimentation/stream turbidity problems? Yes X, No ___, Distance downstream (ft)? 2000 Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
Sediment from dumps observed down to confluence with Carpenter Creek. Squaw Creek has steep gradient and evidence of flood deposition of mine wastes all along Squaw Creek.

SURFACE WATER INVENTORY FORM

SAMPLERS: Tuesday

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-2	SW	150' below base of WR-2	4.39	2150	NM	8.4	0	NM	07-135-SW-2	06/01/93 1300	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-2	SE	150' below base of WR-2	< 3.5	N/A	N/A	N/A	N/A	N/A	07-135-SE-2	06/01/93 1300	T-Metals
SW-3	SW	At road crossing below residence (40' up)	5.27	1180	NM	9.4	0	NM	07-135-SW-3	06/01/93 1545	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-3	SE	At road crossing below residence (40' up)	N/A	N/A	N/A	N/A	N/A	N/A	07-135-SE-3	06/01/93 1545	T-Metals
SW-4	SW	Squaw Crk. above Savage mill and Carpenter Crk.	6.44	890	NM	8.9	3.4	2 cfs (E)	07-135-SW-4	06/01/93 1645	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-4	SE	Squaw Crk. above Savage mill and Carpenter Crk.	N/A	N/A	N/A	N/A	N/A	N/A	07-135-SE-4	06/01/93 1645	T-Metals

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): No Eh Probe available for measurement.

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? Approx. 1 acre in flat area above dump to treat AMD; 2 to 3 acres below dumps in valley.

Wetlands present: Yes___, No X , Describe:___

Carbonate rocks/soils: Yes___, No X , Describe:___

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X ; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments___

Nearest residence(ft or miles)? 1,000 feet

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Tuesday, Belanger

SOURCE I.D. NO.	**ACID MINE DRAINAGE CHARACTERISTICS** (LIST)	**MOISTURE CONTENT** (WET/DRY/PARTIAL)	**SURFACE AREA** (SQUARE FEET)	**UNCOVERED/UNVEGETATED AREA** (SQUARE FEET)	**AVAILABLE FINES** (YES/NO)	**DUST PROPAGATION POTENTIAL** (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	SO3; FEOX; Low pH	Dry	20,475	20,475	Yes	Moderate
WR-2	SO3; FEOX; Low pH	Dry	23,580	23,580	Yes	Moderate
Adit	SPG; FEOX; Low pH	Wet	N/A	N/A	N/A	N/A

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No X , Describe:____

Population within 1 mile: 1-10 X ; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments____

Evidence of recreational use on site: Yes X , No___, Describe: 4-wheel drive vehicle tracks; campfire pit; beer cans.

Accessibility - Fences, warning signs, closed roads? Fences down around Glory hole; easy access to adit and dumps.

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No X , Comment____
Wilderness Area - Yes___, No X , Comment____
T&E Species Habitat - Yes___, No X , Comment____
Bat Habitat - Yes___, No X , Comment____

Primary Drainage X ; Secondary Drainage___; No Information___:

Riparian Habitat Quality - High X , Medium___, Low___
Wetlands Frontage - High___, Medium X , Low___
Fisheries Habitat and Species Classification - 4
Sport Fishery Classification - 4

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes X , No___, Number 1 , types and locations: Fence is down around Glory Hole.

Hazardous structures: Yes___, No X , Number____, types and locations: Relatively new core shed on-site.

Unstable highwalls, pits, trenches, slopes: Yes X , No___, Number 1 , types and locations: Glory hole

Unstable waste piles, impoundments, undercut banks: Yes X , No____, Number 2 , types and locations: WR-1 and WR-2 slopes

Fire and/or Explosion hazards: Yes___, No X , Explain:____

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB, Environmental Assessment Data for Silver Dyke Adit, Prepared by MSE, Inc., October 4 and 29, 1990.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for the Silver Dyke Adit, Prepared by Chen-Northern, October 12, 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Portal Inventory Form for the Silver Dyke-Glory Hole, Prepared by Daphne Digrindakis, June 13, 1985.

USBM, Mines and Mineral Deposits (Except Fuel), Cascade County, Montana, Information Circular 7589, Written by Almon F. Robertson, Competed in April, 1950, pp. 55-56.

USGS, Topographic Map, Neihart, Montana, 7 1/2 minute Quadrangle, 1961.

LABORATORY ANALYTICAL DATA

SILVER DYKE ADIT
PA NO. 07-135

Silver Dyke Adit PA# 07-135
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - TUESDAY
INVESTIGATION DATE: 06/01/93

SOLID MATRIX ANALYSES

Metals in soils   Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
07-135-SE-2	105	164	50.4	11.2	10.3	1500	36500	0.28	1680	13.8	15000	4.05 UJ	6580	NR
07-135-SE-3	33.9	70.7	5.4	11.2	17.5	933	23700	0.062	2230	17	2460	3.07 UJ	842	NR
07-135-SE-4	31.4	49.5	9.5	14.6	14.2	875	24200	0.062 U	1920	14.9	1960	3.22 UJ	1330	NR
07-135-WR-1	124	198	72.7	6.9	10.6	3330	60300	1.35	1460	12.3	31800	5.8 J	7050	NR
07-135-WR-2	217	237	48.6	19	11.2	2530	80900	0.66	4040	29.6	16400	2.8 UJ	6050	NR
BACKGROUND	10.5	131	1.4	6.83	22.2	26.1	20600	0.048 U	607	15.6	667	3.39 UJ	548	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
07-135-WR1	1.98	61.9	-0.4	-62	0.9	0.14	0.94	4.37	-4.78
07-135-WR2	1.97	61.5	1.04	-61	0.94	0.22	0.81	6.87	-5.84

WATER MATRIX ANALYSES

Metals in Water   Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
07-135-GW-1	2.5	29.3	2.55 U	5.99 U	5 U	12.3	173 J	0.150	75.9 JX	8.78 U	5.24 J	18.3 U	497	83.1
07-135-GW-2	2.84	29.4	2.55 U	5.99 U	5 U	25.3	308 J	0.079	204 JX	8.78 U	4.76 J	18.3 U	1350	83.6
07-135-SW-1	4.88	2.24 U	986 J	260	22.7	8950	37400 J	0.150	128000 JX	878	826 J	194	148000	1320
07-135-SW-2	7.12	10.6	838 J	208	18	9440	21900 J	0.120	109000 JX	738	1400 J	147	120000	1090
07-135-SW-3	4.37	16.2	339 J	69	5 U	4220	1540 J	0.140	43100 JX	310	568 J	40.6	56900	495
07-135-SW-4	4.79	21.5	223 J	46	5 U	2700	1290 J	0.160	26000 JX	201	343 J	37	36800	381

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Wet Chemistry   Results in mg/l

Field I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
07-135-GW-1	130	< 5.0	49	0.26	NR
07-135-GW-2	137	< 5.0	51	0.27	NR
07-135-SW-1	2720	< 5.0	1710	0.1	NR
07-135-SW-2	2280	< 5.0	1410	0.08	NR
07-135-SW-3	1040	< 5.0	642	< 0.05	NR
07-135-SW-4	732	< 5.0	466	0.1	NR

LEGEND

SE2 - 150 feet below base of waste rock dump 2.
SE3 - At road crossing below residence (40' UP).
SE4 - Squaw Creek above Savage Mill and Carpenter Creek.
WR1 - Composite of subsamples WR1A, 1B, and 1C.
WR2 - Composite of subsamples WR2A through 2E.
BACKGROUND - 280' West of waste rock dump 1, from the Silver Dyke Adit (07-135-SS-1).

GW1 - Glen Hawthorne residence.
GW2 - Duplicate of sample 07-135-GW1.
SW1 - Adit discharge.
SW2 - Same as sample SE2.
SW3 - Same as sample SE3.
SW4 - Same as sample SE4.

XRF ANALYSIS RESULTS

SILVER DYKE ADIT
PA NO. 07-135

Mine Name: Silver Dyke Adit PA# 07-135
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
07-135-SE-2		10320.6	2898.94	1101.27		2292.99	40703.3		1213.59	1455.19		159.674
07-135-SE-3		10341.8	5268.35	1328.81		2265.89	24955		532.465	566.877		207.519
07-135-SE-4		7935.01	5532.29	1139.48		1660.83	22774.5	433.558 *	588.175	504.092		200.802
07-135-SS-1		16493.9	8050.17	3702.62		455.63 *	22696.7			599.769		263.068
07-135-WR1-A		16807.1	1881.1	1993.31		1273.12 *	81810.6	810.689 *	2656.37	2805.11		120.153
07-135-WR1-B		21149.8	1748.19	2070.04		805.419 *	64889.3		3000.26	1413.18		113.341
07-135-WR1-B-DUP		20805.8	1889.65	2030.06		1205.37 *	64742.6		2912.61	1367.93		105.984
07-135-WR1-C		17320.6	4614.92	3206.28		3378.32	59104.4		3361.07	1953.38		145.717
07-135-WR2-A		14831.1	4855.51	1220.8	126.374 *	15467.5	48990.5		2210.17	4727.84		174.685
07-135-WR2-B		15321.7	1378.66	907.604			48536.1		1912.28	755.945		119.029
07-135-WR2-C		16892.2	2028.16	1550.81		1310.61 *	62526.6		933.711	1335.74		108.425
07-135-WR2-D		17084.1	8110.11	1590.19	154.185 *	3064.84	25588.3		302.695	1356.35		225.084
07-135-WR2-E		14225.9	3127.08	793.915		3153.79	63981.9		2945.24	2751.77		154.487
07-135-WR-1-COMP		17898.8	2455.44	2357.1		1128.28 *	71762.3		2656.62	1958.34		127.412
07-135-WR-2-COMP		20377.5	3803.03	1768.86		1695.35 *	59610.5	497.557 *	1550.87	3143.01		160.875

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
07-135-SE-2	134.291		14.2573 *	1756.2	176.503			3906.57	119.119 *		
07-135-SE-3	143.14		81.3985	1267.45	135.078			1057.12	89.9344 *		25.8395 *
07-135-SE-4	71.4198			1182.41	124.395			938.556			28.4875 *
07-135-SS-1	274.797			353.132	98.4469			758.244	85.1236 *		22.8185 *
07-135-WR1-A	146.446		18.8235 *	10615.4	261.35			2270.74	383.038		53.2396 *
07-135-WR1-B	144.785		10.7249 *	9025.12	287.993			1021.77	202.568 *		62.0669 *
07-135-WR1-B-DUP	149.562			9108.97	292.765			956.465	262.728		61.9915 *
07-135-WR1-C	179.975			6372.83	250.585			1260.52	202.664 *		25.9006 *
07-135-WR2-A	181.636		9.07591 *	5950.51	168.925	170.694 *		1167.92			42.3046 *
07-135-WR2-B	126.567		36.0799	15837.6	208.093		126.784 *	1742.87	229.223 *		63.0609 *
07-135-WR2-C	136.438		15.446 *	4656.49	260.466		60.473 *	1743.67	143.095 *		38.6118 *
07-135-WR2-D	154.673		6.99574 *	851.452	206.141			1029.58	96.6806 *		20.017 *
07-135-WR2-E	129.364		80.5581	11562.8	200.897		79.2246 *	4314.23	167.859 *		43.1218 *
07-135-WR-1-COMP	170.626			9514.04	276.977	187.115 *		1581.19	333.169		70.767 *
07-135-WR-2-COMP	146.22		20.4435 *	11425.9	248.147	197.987 *		1474.54	188.917 *		35.2081 *

* - Estimated Quantity
$ - Unvalidated Data

SUMMARY OF HISTORICAL ANALYTICAL DATA
FROM OTHER SOURCES

DATE: October 4, 1990

CLIENT: Abandon Mines

FIELD ID: Silver Dyke Adit

LAB NO: W8558

DATE RECEIVED: 09-14-90

Hardness 1600 mg/L as $CaCO_3$

Total Extractable Metals

As <0.001 mg/L

Cd 0.596 mg/L

Cu 4.55 mg/L

Fe 32.0 mg/L

Pb 0.345 mg/L

Zn 329 mg/L

DATE: October 29, 1990

CLIENT: Abandoned Mines

FIELD ID: Silver Dyke Adit Dump Material

LAB NO: S2699

DATE RECEIVED: 09-24-90

pH (1:1 slurry) 2.25 SU

Total Metals

As 164 mg/Kg

Cd 8 mg/Kg

Cu 1020 mg/Kg

Fe 27,100 mg/Kg

Pb 4840 mg/Kg

Zn 530 mg/Kg

DATE: October 29, 1990

CLIENT: Abandoned Mines

FIELD ID: Silver Dyke Adit Dump Material

LAB NO: S2697

DATE RECEIVED: 09-24-90

pH (1:1 slurry) 4.10 SU

Total Metals

As 242 mg/Kg

Cd 2 mg/Kg

Cu 2850 mg/Kg

Fe 44,600 mg/Kg

Pb 9320 mg/Kg

Zn 1510 mg/Kg

DATE: October 29, 1990

CLIENT: Abandoned Mines

FIELD ID: Silver Dyke Shear Zone East of Adit

LAB NO: S2696

DATE RECEIVED: 09-24-90

pH (1:1 slurry) 6.54 SU

Total Metals

As 92 mg/Kg

Cd 12 mg/Kg

Cu 138 mg/Kg

Fe 57.600 mg/Kg

Pb 3240 mg/Kg

Zn 2800 mg/Kg

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

SILVER DYKE ADIT
PA NO. 07-135

MDSL AMRB/PIONEER 4/9/93

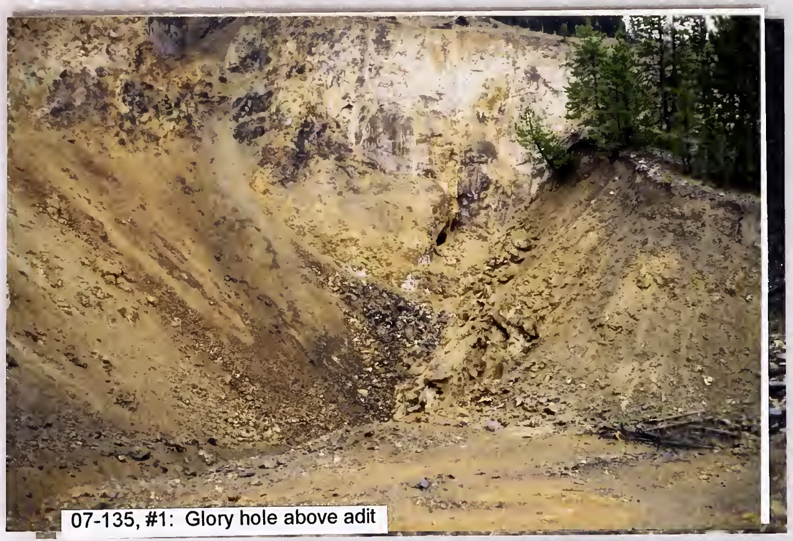
AIMSS SCORESHEET

SITE NAME: SILVER DYKE ADIT
PA NUMBER: 07-135

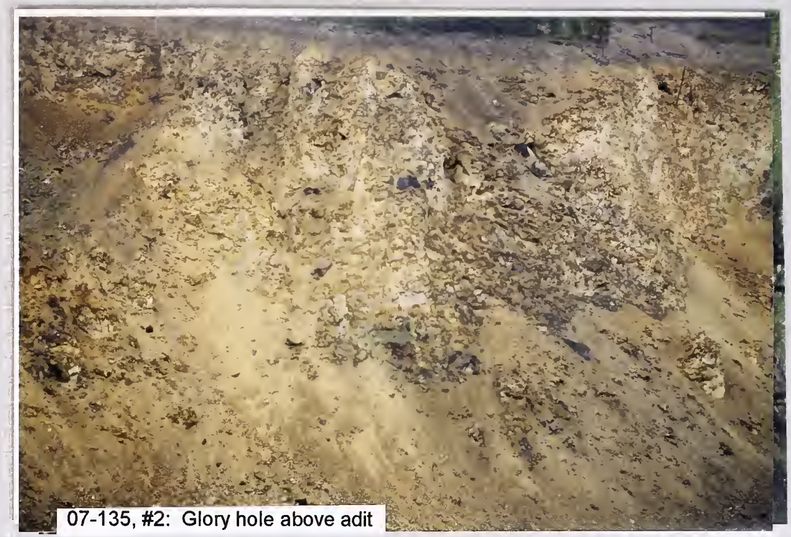
LINE NO.				
		GROUNDWATER PATHWAY		
1		OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A	GW - LIKELIHOOD OF RELEASE	CONTAINMENT		20
3B		GW DEPTH		10
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	200
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	200
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	1059.905
6		WELLS - 1 MI. x 2.5		2.5
7	GW - TARGETS	WELLS - 1 TO 4 MI		11
8		NEAREST WELL		5
9		TARGETS SCORE	LINES 6 + 7 + 8	18.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	3921649
		SURFACE WATER PATHWAY		
11		OBSERVED RELEASE		0
12	SW - LIKELIHOOD OF RELEASE	EXCEEDENCES		100
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	500
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	1211.718
16		DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		2
18		WETLANDS		10
19	SW - TARGETS	FISHERY		1
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 - 22	20
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	12117180
		AIR PATHWAY		
25		OBSERVED RELEASE		0
26A	AIR - LIKELIHOOD OF RELEASE	CONTAINMENT		15
26B		DISTANCE TO POPULATION		10
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	150
27		LIKELIHOOD SCORE	LINES 25 + 26C	150
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	5.221
29		POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		5
31	AIR - TARGETS	WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 - 33	35
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	27410
		DIRECT CONTACT PATHWAY		
36		OBSERVED EXPOSURE		50
37A	LIKELIHOOD OF EXPOSURE	ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		10
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	200
38		LIKELIHOOD SCORE	LINES 36 + 37C	250
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	4.734
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		10
41		NEAREST RESIDENCE		5
42		RECREATIONAL USE		2
43		TARGETS SCORE	SUM LINES 40 - 42	17
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	20120
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**160.86**

SITE NAME: SILVER DYKE ADIT
PA NUMBER: 07-135

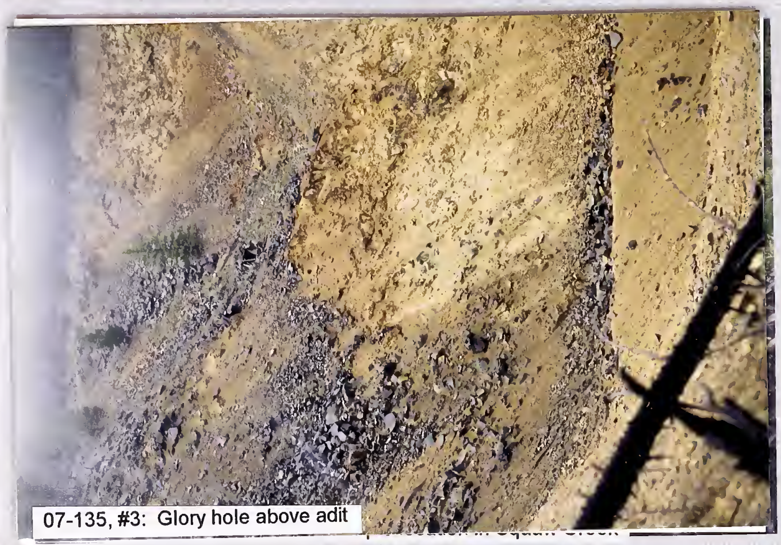
LINE NO.		SITE SAFETY		
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	75
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 - 7	75
9		POPULATION - 1 MILE		10
10	TARGETS	NEAREST RESIDENCE		5
11		RECREATIONAL USE		2
12		TARGETS SCORE	SUM LINES 9 - 11	17
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**25.50**



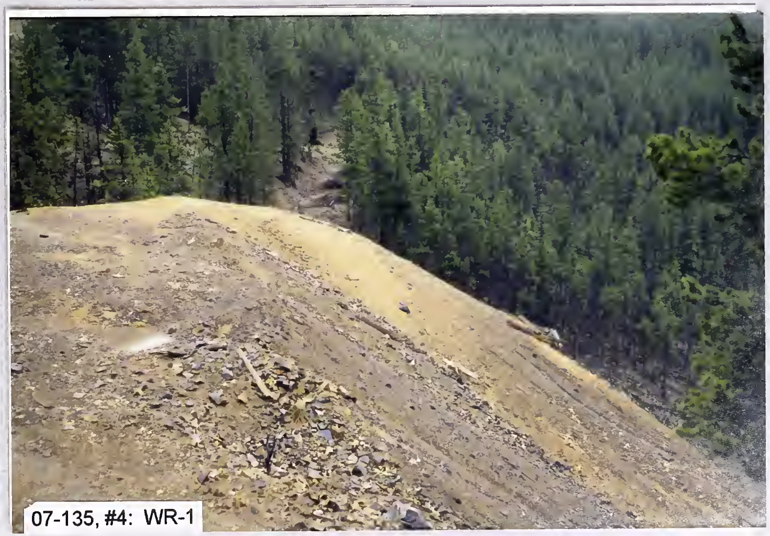
07-135, #1: Glory hole above adit



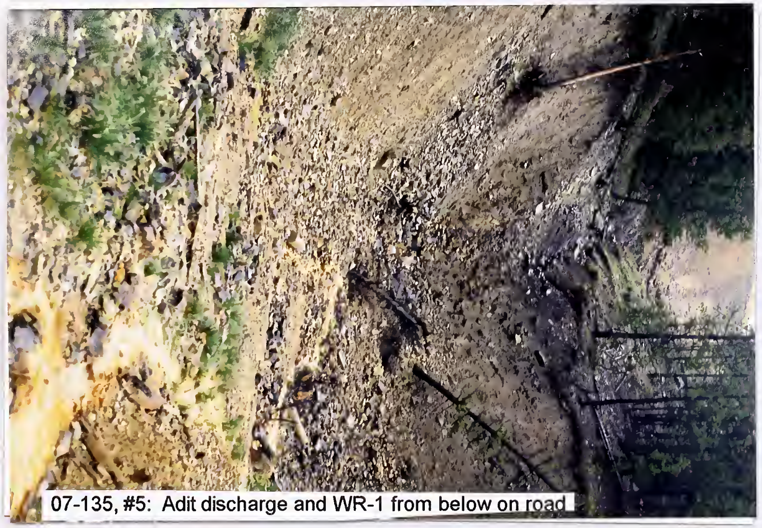
07-135, #2: Glory hole above adit

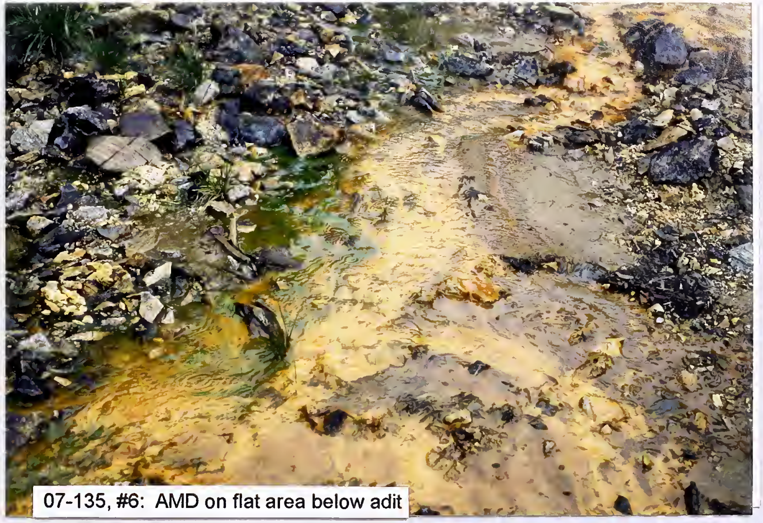


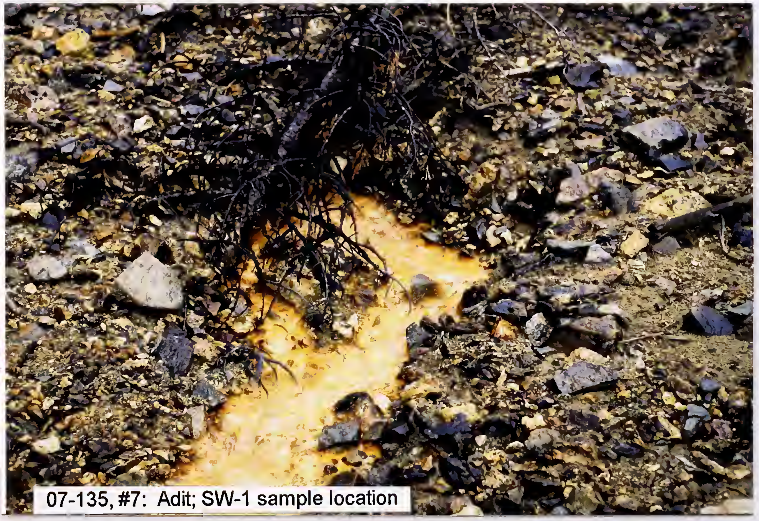
07-135, #3: Glory hole above adit

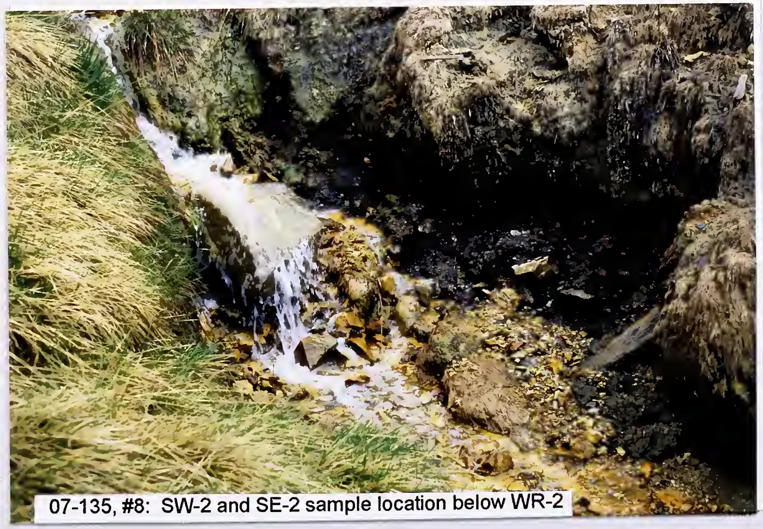


07-135, #4: WR-1


07-135, #5: Adit discharge and WR-1 from below on road


07-135, #6: AMD on flat area below adit


07-135, #7: Adit; SW-1 sample location


07-135, #8: SW-2 and SE-2 sample location below WR-2

07-135, #9: WR-2

07-135, #10: SW-3 and SE-3 sample location in Squaw Creek

07-135, #11: SW-4 and SE-4 sample location in Squaw Creek

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: SILVER DYKE TAILINGS **PA#:** 07-137

Date: May 26, 1993 **Time:** 0850

Field Team Leader: Tuesday, Pioneer

Sampling Personnel: Belanger, Flammang, Clark,
Lasher; Pioneer
Pierson; TD&H

Visitors: Earl McCurley, MDSL

Weather/Seasonality Observations: Cloudy; rainy; breezy; 55°F; clearing to partly cloudy later in the afternoon.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #12: TP-5 across Carpenter Creek; #13: TP-4 coarse tailings; #14,#15: Right side (East) of TP-3 (pond); #16,#17: Left side (West) of TP-3; #18,#19: TP-1 upper part of tailings site; #20,#21: TP-6 coarse tailings above impoundment (West). Video Tape No. 1

General Comments/Observations (not covered specifically in attached Inventory Forms): Tailings appear to be only 4 feet deep in drainage bottom; Tailings across Carpenter Crk. are only 9 inches deep in center of large deposit due south of Silver Dyke Tailings site.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Water in unnamed tributary should be routed around tailings or through tailings by pipe or ditch. Oversteepened and steepened banks should be contoured to more gentle contours and revegetated to hold.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): SILVER DYKE TAILINGS PA#: 07-137

Legal Description: T 14N ;R 8E ;Sec. 15 , SE1/4NW 1/4 ___1/4

County: CASCADE Mining District: NEIHART

Latitude: N 46° 58' 32" Longitude: W 110° 41' 43"

Primary Drainage Basin and Code: Belt Creek/10030105
Secondary Drainage Basin: Carpenter Creek
USGS Quadrangle map name(s): Neihart

Mine Type/Commodities: Tailings/Silver, Lead, Zinc

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Public
Owner, Agent, or Contact(Include address and phone when available): Lewis and Clark National Forest, P.O. Box 871, Great Falls, MT 59403.

Relationship to other mines/sites in the area/district: Tails. are from ore from the Silver Dyke Adit 1/2 mi to the North and were milled in Silver Dyke Mill 1/4 mi to West and flumed to present location. Additional tails. were deposited in Carp. Crk. Pond.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 6400' , Slope 38-40° on West side; 28-30° on East side , Aspect Site lies in drainage and faces both East and West.

Land use: Mining___, Recreational X , Residential___, Urban___, Agricultural___, Other(Specify)

Area of disturbed/unvegetated lands? 4 acres.
Dimensions: 700 feet x 500 feet

Predominant vegetation types: Lodgepole pine forest on slopes above tailings; snake grass attempting to pioneer drainage bottom in tailings.

Access: roads - good X ,poor___,4wd___,trail___.
Other logistical considerations (proximity to other sites). Carp. Crk. Tails. ponds are on same road approx. 1 mi southwest. Sherman #2 is on opposite side of Carp. Crk. from tailings.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are no well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Tailings lie in unnamed tributary of perennial Carpenter Creek. Tributary flows south through tailings. Carpenter Creek flows west to the major drainage Belt Creek. The site is underlain by quartz monzonite.

Mining/milling history, ore type/tenor, host rock, gangue: A 500-ton concentrating mill was constructed in the 1920s; later, it was increased to 950-tons. Fine tailings were flumed to Silver Dyke Tailings site and Carpenter Creek Tailing site. Ore was a complex mixture of both sulfide and oxide or carbonate mineral disseminated in a gangue of highly altered quartz porphyry and gneiss. Recoveries from processing were 78% Cu, 81% Ag, and 73% Pb.

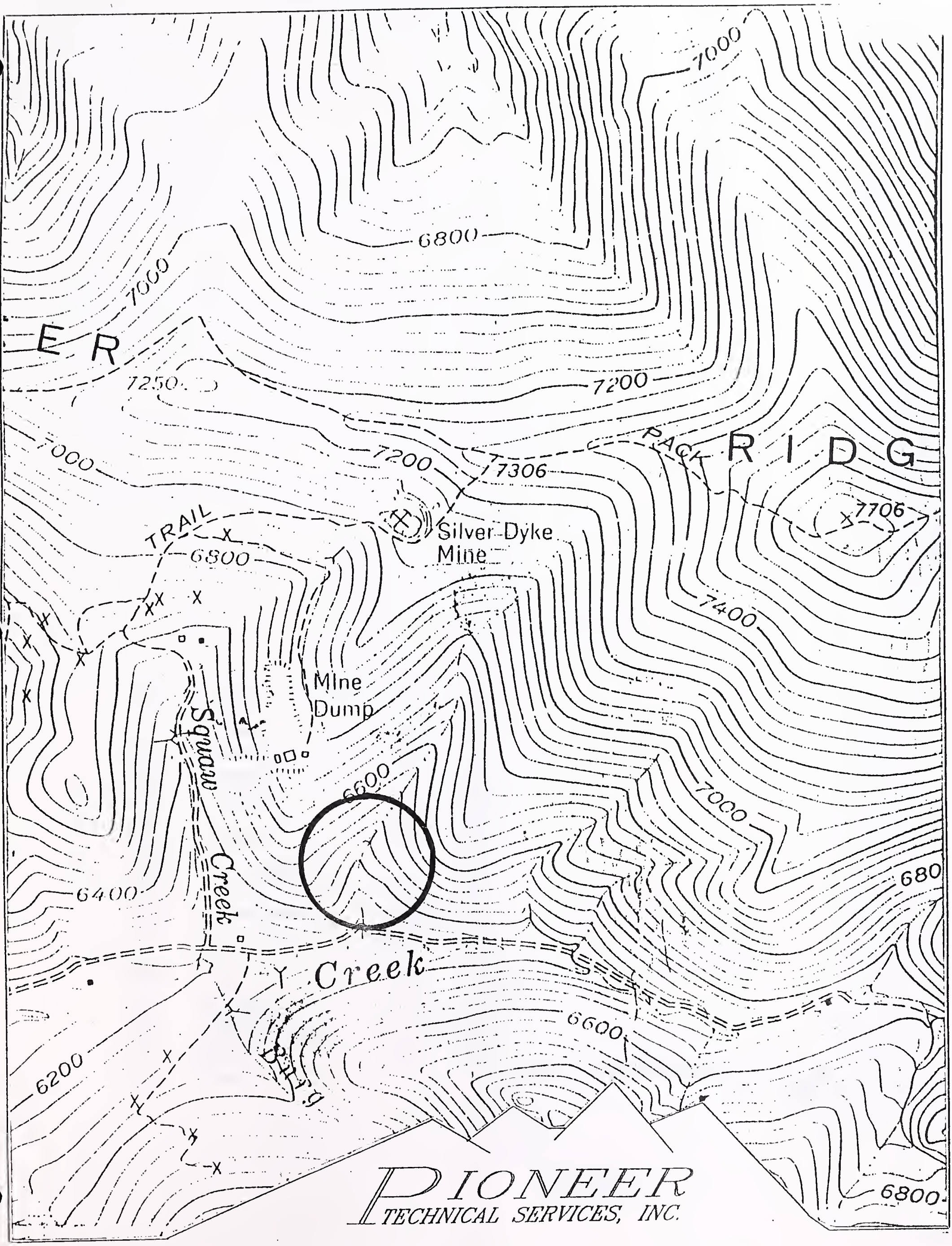
Mine Operation?
Shafts - Yes___, No X, # _____, Comment
Adits - Yes___, No X, # _____, Comment
Pits - Yes___, No X, # _____, Comment
Placers - Yes___, No X, # _____, Comment
Other - Yes___, No X, # _____, Comment

Mill Operation? Yes____, No X. If yes answer the next three questions:

Period(s) of Operation: Mill where tailings originated operated from 1922 to 1929.

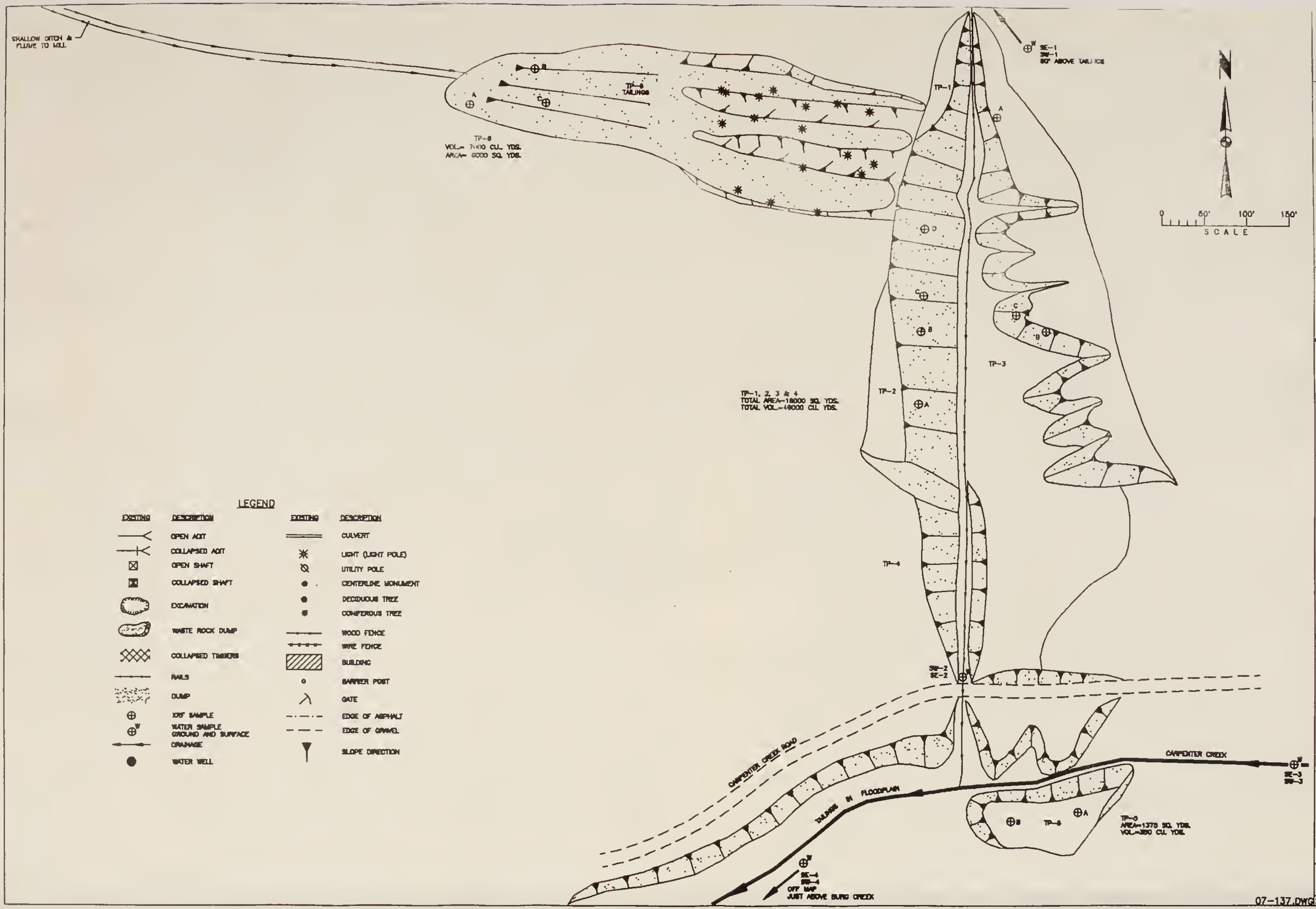
Origin of Ore Milled - Custom Mill___ Dedicated Mill X; Number and names of mines that supplied mill feed: Silver Dyke Mill

Process? Hg-amalgam, CN$^-$ leach (vat, heap), floatation, smelting?
Floatation



SILVER DYKE TAILINGS, P.A. NO. 07-137

T14N, R08E, SECTION 15
SCALE: 1" = 1000'



LEGEND

EXISTING	DESCRIPTION	EXISTING	DESCRIPTION
—<	OPEN ADIT	═	CULVERT
—+<	COLLAPSED ADIT	✳	LIGHT (LIGHT POLE)
☒	OPEN SHAFT	⦰	UTILITY POLE
⧓	COLLAPSED SHAFT	● ·	CENTERLINE MONUMENT
	EXCAVATION	●	DECIDUOUS TREE
	WASTE ROCK DUMP	✱	CONIFEROUS TREE
	COLLAPSED TIMBERS	—·—·—	WOOD FENCE
—·—·—	RAILS	—×—×—	WIRE FENCE
	DUMP	▨	BUILDING
⊕	XRF SAMPLE	○	BARRIER POST
⊕ᵂ	WATER SAMPLE GROUND AND SURFACE	⋏	GATE
—◆—	DRAINAGE	—·—	EDGE OF ASPHALT
●	WATER WELL	— —	EDGE OF GRAVEL
		▼	SLOPE DIRECTION

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

SILVER DYKE TAILINGS PA# 07-137
NEIHART DISTRICT CASCADE COUNTY

PIONEER TECHNICAL SERVICES, INC. BUTTE, MT.

TD&H

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS-BOZEMAN-KALISPELL MONTANA
SPOKANE WASHINGTON

DRAWN MWC DATE 8/93
DESIGNED TPS JOB NO. 93-17
APPROVED F.B. NO.

SHEET NO.

07-137.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution(approximate % sand, silt, & clay): Interbedded from medium sand to clay; some piles consist mainly of coarse pebbles; 50% sand, 20% clay, 10% silt, 10% pebbles.

Determine tailings impoundment depth and describe stratification of the tailings if observable(based on texture and color): Depth in drainage bottom appears to be 4'. Max. depth of tails. is much deeper. Tails. at TP-5 were only 9" deep. Some stratification is apparent in XRF analysis.

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): Moist (mostly due to rain/runoff)

Describe condition of the tailings impoundment(Note condition of dams or structures, location of breaches): Dam has failed and middle section was washed away in catastrophic event. Failed dam walls present on east and west side of drainage.

Comments on potential for mitigation: Water in valley should be routed around tailings or through tailings by culvert. Steep banks should be contoured.

SOURCE INVENTORY FORM

SAMPLERS: Belanger, Pierson, Lasher, Flammang

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
TP-1A	TAIL	49,000	Holes in pile furthest north in unnamed tributary	Breached Dam	NM	NM			
TP-1B	TAIL		Holes in pile furthest north in unnamed tributary	Breached Dam	NM	NM			
TP-1C	TAIL		Holes in pile furthest north in unnamed tributary	Breached Dam	NM	NM			
TP-2A	TAIL		Large pile on west side of unnamed tributary; south end	Breached Dam	6.87 (S)	0.05	07-137-TP-1	05/26/93 1635	T-Metals, ABA
TP-2B	TAIL		Large pile on west side of unnamed tributary; north of WR-2A	Breached Dam	NM	NM			
TP-2C	TAIL		Large pile on west side of unnamed tributary; north of WR-2B	Breached Dam	7.52 (S)	0.04	07-137-TP-2	05/26/93 1635	T-Metals, ABA
TP-2D	TAIL		Large pile on west side of unnamed tributary; south end	Breached Dam	NM	NM			
TP-3A	TAIL		East side of unnamed tributary	Failed Dam	NM	NM			
TP-3B	TAIL		East side of unnamed tributary	Failed Dam	NM	NM			
TP-3C	TAIL		East side of unnamed tributary	Failed Dam	NM	NM			
TP-4A	TAIL		Small pile on west side of unnamed tributary, below failed dam	Breached Dam	NM	NM			
TP-4B	TAIL		Small pile on west side of unnamed tributary, below failed dam	Breached Dam	NM	NM			
TP-5A	TAIL	350	Center of small deposit on opposite side of Carpenter Creek	None	NM	NM			
TP-5B	TAIL		Edge of small deposit on opposite side of Carpenter Creek	None	NM	NM			
TP-6A	TAIL	7,000	Hole closest to mill, near top of TP-6	Breached Dam	6.77 (S)	0.04	07-137-TP-6	05/26/93 1910	T-Metals, ABA
TP-6B	TAIL		North side of TP-6	Breached Dam	NM	NM			
TP-6C	TAIL		Near top of center lobe on TP-6	Breached Dam	NM	NM			

D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 07-137-TP-1 taken from holes 2A & 3B, est. to be middle of the existing pile (grouped using XRF data); 07-137-TP-2 taken from holes 2C & 3C, est. to be lower portion of the pile (grouped using XRF data); 07-137-TP-6 is composite of 3 holes from 3 lobes on uppermost pile closest to mill. Measurements were taken of lab samples only.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No X , Number:____ Identification:______________

Filled shafts: Yes___, No X , Number:____ Identification:______________

Seeps/Springs: Yes___, No X , Number:____ Identification:______________

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 21

Distance to nearest well used for drinking? 1/2 mile

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable X , Possible____, Unlikely____.
High metal values in tailings, groundwater could be flowing through them; relatively shallow groundwater in floodplain (both Carpenter Creek and unnamed drainage).

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: ______________________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______________________________

____

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X, No ___, Name(s): Unnamed tributary dissects site. Carpenter Creek runs along southern border of site.

Dry streambeds: Yes ___, No X, Name(s): ___

Other surface water: Yes ___, No X, Name(s)/Description: ___

Waste materials within any floodplain: Yes X, No ___ Source ID(s): TP-1, -2, -3, -4, -5 are in floodplain of unnamed tributary. TP-1 and -5 are in floodplain of Carpenter Creek

Approximate Flood frequency? X 1 yr, ___ 10 yr, ___ 100 yr

Estimated seasonal flow of stream(s) (cfs)? Spring flow is 60.2 cfs.
High Flow: 70 cfs, Average Flow: 5-10 cfs

Distance between waste source(s) and nearest surface water body (ft)? 0 feet; unnamed tributary cuts through the tailings.

Surface water draining onto or through waste sources: Yes X, No ___, Describe: Numerous gullies in tailings indicate water is draining across site during storm events. Unnamed tributary is flowing, bisecting the site. It appears to have cut down to near or at original grade surface, but banks and sediment is tailings.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?) Wetland, irrigation, fishery

Observed erosional/sedimentation/stream turbidity problems? Yes X, No ___, Distance downstream (ft)? 1 mi. Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): Large volume of tailings are present in Carpenter Creek and banks down to Carpenter Creek Tailings.

SURFACE WATER INVENTORY FORM

SAMPLERS: Lasher, Flammang

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm at 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	On unnamed tributary above tailing site	8.89	60	N/A	6.2	230	0.94	07-137-SW-1	05/26/93 1230	T-Metals, TDS, Hardness, SO4, NO2/NO3, Cl
SE-1	SE	On unnamed tributary above tailing site	N/A	N/A	N/A	N/A	N/A	N/A	07-137-SE-1	05/26/93 1230	T-Metals, ABA
SW-2	SW	On unnamed tributary site at PPE just above road	8.89	100	N/A	9.5	265	1.66	07-137-SW-2	05/26/93 1355	T-Metals, TDS, Hardness, SO4, NO2/NO3, Cl
SE-2	SE	On unnamed tributary site at PPE just above road	6.8	N/A	N/A	N/A	N/A	N/A	07-137-SE-2	05/26/93 1355	T-Metals, ABA
SW-3	SW	On Carpenter Creek above tailing site	8.3	60	N/A	6	210	20.2	07-137-SW-3	05/26/93 1500	T-Metals, TDS, Hardness, SO4, NO2/NO3, Cl
SE-3	SE	On Carpenter Creek above tailing site	N/A	N/A	N/A	N/A	N/A	N/A	07-137-SE-3	05/26/93 1500	T-Metals, ABA
SW-4	SW	On Carpenter Creek 350' above confluence with Squaw Creek	8.42	60	N/A	6.9	220	33.4	07-137-SW-4	05/26/93 1830	T-Metals, TDS, Hardness, SO4, NO2/NO3, Cl
SE-4	SE	On Carpenter Creek 350' above confluence with Squaw Creek	6.6	N/A	N/A	N/A	N/A	N/A	07-137-SE-4	05/26/93 1830	T-Metals, ABA

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): Flow is estimate based on volume/unit time, rather than with a flow meter.

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides? (SO_3)

Presence of evaporative salt deposits? (ESD)

Discolored or turbid seepage? (SPG)

Presence of long filamentous algae in drainages, mosses in moist areas?

Presence of ferric hydroxide precipitates? (FEOX)

Presence of burned or stressed vegetation? (VEG)

pH ≤ 5.0 (pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? Approx. 4 acres presently covered by the tailings.

Wetlands present: Yes___, No_X_, Describe:

Carbonate rocks/soils: Yes_X_, No___, Describe: Carbonate ore minerals are reported in literature to be present.

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100_X_; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 1/4 mile

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Belanger, Pierson, Lasher, Flammang

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
TP-1	FEOX	Dry	162,000	162,000	Very little	Low
TP-2	FEOX	Dry			Yes	High
TP-3	FEOX	Dry			Yes	High
TP-4	FEOX	Dry			Yes	High
TP-5	FEOX	Dry	12,375	12,375	Yes	High
TP-6	FEOX	Dry	72,000	72,000	No	None

Notes and Clarifications: TP-2, -3, and -4 are part of TP-1 pond.

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_,
Describe:____

Population within 1 mile: 1-10___; 10-30_X_; 30-100___; 100-300___;
300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments Recreational cabins, one residence

Evidence of recreational use on site: Yes___, No_X_, Describe:________

Accessibility - Fences, warning signs, closed roads? Easily accessible; Carpenter Creek Road is washed out at base of site (2WD).

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment________
Wilderness Area - Yes___, No_X_, Comment________
T&E Species Habitat - Yes___, No_X_, Comment________
Bat Habitat - Yes___, No_X_, Comment________

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High___, Medium_X_, Low___
Wetlands Frontage - High___, Medium___, Low_X_
Fisheries Habitat and Species Classification - _6_
Sport Fishery Classification - _6_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes___, No_X_, Number____, types and locations:___

Hazardous structures: Yes___, No_X_, Number____, types and locations:_

Unstable highwalls, pits, trenches, slopes: Yes_X_, No___, Number_2_,
types and locations: Highwalls due to catastrophic dam failure - one on west side appears particularly dangerous.

Unstable waste piles, impoundments, undercut banks: Yes_X_, No____,
Number____, types and locations: Many slopes on the tailing piles are unstable.

Fire and/or Explosion hazards: Yes___, No_X_, Explain:________

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB, Environmental Assessment Analytical Data, Prepared by MSE, Inc., October 4, October 29, and November 15, 1990.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Silver Dyke Tailings, Prepared by Chen-Northern, October 13, 1989.

USBM, Mines and Mineral Deposits (Except Fuels), Cascade County, Montana, Information Circular 7589, Written by Almon F. Robertson, Competed in April 1950, pp. 55-56.

USGS, Topographic Map, Neihart, Montana, 7 1/2 minute Quadrangle, 1961.

LABORATORY ANALYTICAL DATA

SILVER DYKE TAILINGS
PA NO. 07-137

Silver Dyke Tailings PA# 07-137
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - TUESDAY
INVESTIGATION DATE: 05/26/93

SOLID MATRIX ANALYSES

Metals in soils Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
07-137-SE-1	17.7	67.3 J	4.4 JX	18.2 J	28.3	63.5	26400	0.023	855 J	26.4 J	586 J	3.1 UJ	712 J	NR
07-137-SE-2	55.9	469 J	13.0 JX	10.5 J	14.3	6440	37300	0.034	2950 J	26 J	7440 J	3.34 UJ	1430 J	NR
07-137-SE-3	14.1	79.1 J	1.5 JX	16.5 J	31.5	55.8	21300	0.023	317 J	23.3 J	145 J	4.43 UJ	237 J	NR
07-137-SE-4	70.9	724 J	14.7 JX	12.8 J	45.2	3680	45500	0.073	2670 J	48.6 J	7730 J	4.36 UJ	1670 J	NR
07-137-TP-1	48.1	836 J	8.1 JX	4.15 J	11.9	4200	36600	0.057	1080 J	12.1 J	8620 J	2.96 UJ	816 J	NR
07-137-TP-2	64.5	1040 J	6.7 JX	7.49 J	20.7	5510	45000	0.066	2120 J	17.1 J	14200 J	3.51 UJ	798 J	NR
07-137-TP-6	54.2	254 J	6.7 JX	8.55 J	12.5	1140	31300	0.051	1560 J	16 J	2920 J	3.01 UJ	838 J	NR
BACKGROUND	10.5	131	1.4	6.83	22.2	26.1	20600	0.048 U	607	15.6	667	3.39 UJ	548	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
07-137-TP1	0.46	14.4	6.20	-8.17	0.16	0.08	0.22	2.50	3.71
07-137-TP2	0.26	8.12	8.34	0.27	0.14	0.04	0.08	1.25	7.14
07-137-TP6	1.09	34.1	8.64	-25.4	<0.01	0.59	0.50	18.4	-9.79

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
07-137-SW-1	1.49 U	9.4	2.55 U	5.99 U	9.03 J	1.35 U	20.1	0.15 J	2.6 U	8.78 U	1 U	18.3 U	20 J	26.8
07-137-SW-2	1.49 U	24.2	2.55 U	5.99 U	12.5 J	24.2	85.4	0.17 J	15.8 J	8.78 U	32.2 J	18.3 U	80.5 J	36.5
07-137-SW-3	1.49 U	10.2	2.55 U	5.99 U	12.3 J	1.35 U	45.2	0.29 J	2.6 U	8.78 U	1.2 J	18.3 U	6 U	23.1
07-137-SW-4	1.49 U	11.4	2.55 U	5.99 U	6.43 J	3.8	62.8	0.15 J	4.37 J	8.78 U	8.36 J	18.3 U	9.9 J	23.7

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
07-137-SW1	62	< 5.0	8	< 0.05	NR
07-137-SW2	68	< 5.0	15	< 0.05	NR
07-137-SW3	47	< 5.0	< 5.0	< 0.05	NR
07-137-SW4	54	< 5.0	< 5.0	0.08	NR

LEGEND

SE1 - On unnamed tributary above site.
SE2 - On unnamed tributary at PPE above road.
SE3 - On Carpenter Creek above tailings site.
SE4 - On Carpenter Creek, 350' above confluence with Squaw Creek.
TP1 - Composite of holes 2A and 3B (estimated to be middle of existing pile).
TP2 - Composite of holes 2C and 3C (estimated to be lower portion of pile).
TP6 - Composite of holes on upper most pile closest to mill.
BACKGROUND - From Silver Dyke Adit (07-135-SS-1).

SW1 - Same as sample SE1.
SW2 - Same as sample SE2.
SW3 - Same as sample SE3.
SW4 - Same as sample SE4.

XRF ANALYSIS RESULTS

SILVER DYKE TAILINGS
PA NO. 07-137

Mine Name: Silver Dyke Tailings PA# 07-137
XRF Field Analyses
Results in PPM
Page 1 of 2.

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
07-137-SE-1		12006.2	19202.2	1482.36		1163.2 *	30578.5			584.49		546.103
07-137-SE-2		19986.8	8329.19	2742.34		3831.98	44010.5		3176.67	1720.21		207.601
07-137-SE-3		13409.5	23547.3	2597.83		1357.38 *	36714.3			290.867		523.312
07-137-SE-4		19035.2	11013.1	2925.29		3553.49	45782.2		2225.17	1104.42		284.277
07-137-TP1-A		17539.5	2238.08	1288.3		1873.7	33844.8		1952.15	588.351		141.131
07-137-TP1-B		18012	1930.5	1502.37	135.602 *		23073.6		301.479	505.284		93.6889
07-137-TP1-C		28806.2	4283.1	4003.5		936.557 *	43097.2		4236.57	458.413		137.692
07-137-TP2-A		23333.5	3045.14	2244.07		1427.64 *	33074.4		2462.32	640.936		146.991
07-137-TP2-B		20378.7	2487.87	2106.02		2585.53	31648.2		3034.33	630.755		159.455
07-137-TP2-C		21889.3	4186.75	3238.63		1692.59	37740.9		3586.15	479.49		128.973
07-137-TP2-D		26190.2	3933.83	3266.33		1926.67	39689.7		3641.27	590.849		137.795
07-137-TP3-A		24715.3	5194.35	2198.79		2635.78	29039.2		1793	844.915		197.822
07-137-TP3-B		21749.2	2281.56	1503.55		548.955 *	26404.8		2187.63	359.128		121.154
07-137-TP3-C		18580.9	3034.49	2087.5		2385.45	33072.5		3205.97	618.222		136.484
07-137-TP4-A		19906.3	8016.8	2807.34	130.53 *	3976.18	31637.2		1013.24	1746.45		213.56
07-137-TP4-B		21698	3890.1	1833.26		5763.35	31979.7		2305.14	2652.15		131.75
07-137-TP5-A		14713.1	2432.24	1859.67		1642.75	31483.4		2673.04	452.678		117.584
07-137-TP5-B		11928.3	1830.47	1265.16		1138.42 *	27260.3		2027.63	475.259		94.2761
07-137-TP6-A		16154.4	2068.11	1979.53			41792		523.636	453.734		105.115
07-137-TP6-B		21006.6	4693.86	2617.92	130.101 *	5566.93	35541.5		1625.33	1833.7		109.608
07-137-TP6-C		17710.2	4041.67	2588.25		6651.2	43009.7		669.572	911.572		109.915
07-137-TPA-3A		15750.5	2606.36	1758.7		1631.71	28755	360.86 *	2138.17	527.511		114.24
07-137-TP-1-COMP		21917.5	2749.25	2090.88		1129.25 *	31013.3		2323.42	530.143		148.254
07-137-TP-2-COMP		18216.2	2649.68	2080.37		2184.38	38276.2		3517.77	511.602		134.196
07-137-TP-6-COMP		17728.3	4251.91	2598.81		6162.5	37737.1		969.608	1277.23		144.932

* – Estimated Quantity
$ – Unvalidated Data

Mine Name: Silver Dyke Tailings PA# 07-137
XRF Field Analyses
Results in PPM
Page 2 of 2.

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
07-137-SE-1	90.9239			267.822	78.5712			860.85	73.0201 *	14.3705 *	13.3339 *
07-137-SE-2	267.116		11.092 *	5142.18	179.179	223.115 *		2377.69	182.409 *		30.6812 *
07-137-SE-3	106.24			195.69	45.1153 *			583.761	146.828 *		
07-137-SE-4	256.288		24.169 *	4187.99	144.944	159.829 *		2358.29	115.796 *		35.2435 *
07-137-TP1-A	112.532		10.3003 *	4931.77	180.709			1344.55	102.645 *		45.121 *
07-137-TP1-B	115.831		11.2528 *	2746.67	158.99			965.206			26.3872 *
07-137-TP1-C	109.876		11.5392 *	10910.2	279.658	181.716 *		1618.37	210.098 *		52.6772 *
07-137-TP2-A	151.696		11.7156 *	6033.69	182.389			1324.96	104.184 *		38.4757 *
07-137-TP2-B	157.223		20.7779 *	7471.72	187.741	148.548 *		1810.68	169.018 *		44.2094 *
07-137-TP2-C	161.605		14.0169 *	9155.05	181.138	146.11 *		1680.66	192.821 *		38.4858 *
07-137-TP2-D	121.1		17.1939 *	8616.57	245.592			1531.68	164.123 *		48.4914 *
07-137-TP3-A	187.088			4337.74	217.961			1792.83	121.6 *		48.5268 *
07-137-TP3-B	136.138		54.1243	3834.08	195.462			1282.53	74.3207 *		40.1931 *
07-137-TP3-C	124.165		18.4908 *	7190.73	154.888			1444.61	137.033 *		33.6647 *
07-137-TP4-A	180.586		11.388 *	1443.94	155.054			1184.74			20.5182 *
07-137-TP4-B	151.725			2469.18	187.158			1069.19	61.0116 *		37.4445 *
07-137-TP5-A	132.677		17.1739 *	6133.51	134.135			1237.41	72.701 *		31.6706 *
07-137-TP5-B	133.244		18.3048 *	5124.42	103.807			958.059	56.179 *		
07-137-TP6-A	150.907		7.66966 *	4435.56	171.036			912.397	61.5477 *		
07-137-TP6-B	127.903		8.53734 *	2907.26	183.215			971.847	67.652 *		
07-137-TP6-C	121.957			1388.81	177.957			720.821	71.0196 *		
07-137-TPA-3A	134.135		13.4051 *	5396.32	141.932			1186.63	86.4936 *		38.1613 *
07-137-TP-1-COMP	150.708		34.8912	4781.97	199.812			1195.07	75.1462 *		29.4606 *
07-137-TP-2-COMP	224.707		15.4804 *	6658.39	142.666			1318.5	162.063 *		31.8333 *
07-137-TP-6-COMP	149.979			1975.71	173.265						

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

SILVER DYKE TAILINGS
PA NO. 07-137

AIMSS SCORESHEET

SITE NAME: SILVER DYKE TAILINGS
PA NUMBER: 07-137

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	222.843
6	GW - TARGETS	WELLS - 1 MI. x 2.5		2.5
7		WELLS - 1 TO 4 MI		20
8		NEAREST WELL		5
9		TARGETS SCORE	LINES 6 + 7 + 8	27.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	2451273
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		300
12		EXCEEDENCES		100
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	800
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	246.463
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		5
18		WETLANDS		10
19		FISHERY		0
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 - 22	22
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	4337749
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		20
26B		DISTANCE TO POPULATION		10
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	200
27		LIKELIHOOD SCORE	LINES 25 + 26C	200
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	2.643
29	AIR - TARGETS	POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		5
31		WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 - 33	35
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	18501
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		0
37A		ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		10
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	200
38		LIKELIHOOD SCORE	LINES 36 + 37C	200
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	2.390
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		10
41		NEAREST RESIDENCE		5
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 - 42	15
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	7170
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**68.15**

SITE NAME: SILVER DYKE TAILINGS
PA NUMBER: 07-137

SITE SAFETY

LINE NO.				
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	150
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 - 7	150
9		POPULATION - 1 MILE		10
10	TARGETS	NEAREST RESIDENCE		5
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 - 11	15
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**45.00**

SUMMARY OF HISTORICAL ANALYTICAL DATA FROM OTHER SOURCES

MDSL AMRB/PIONEER 4/9/93

REPORT DATE: October 4, 1990

CLIENT: Abandon Mines

FIELD ID: Silver Dyke Tailings

LAB NO: W8559

DATE RECEIVED: 09-14-90

Hardness 71 mg/L as $CaCO_3$

Total Extractable Metals

As <0.001 mg/L

Cd 0.0036 mg/L

Cu 0.05 mg/L

Fe 0.06 mg/L

Pb 0.064 mg/L

Zn 0.28 mg/L

DATE: October 29, 1990

CLIENT: Abandoned Mines

FIELD ID: Silver Dyke Tailings from Failed Dam--09/20/90

LAB NO: S2720

DATE RECEIVED: 09-24-90

pH (1:1 slurry) 6.06 SU

Total Metals

As	265	mg/Kg
Cd	2	mg/Kg
Cu	4470	mg/Kg
Fe	40,900	mg/Kg
Pb	13,100	mg/Kg
Zn	675	mg/Kg

DATE: October 29, 1990

CLIENT: Abandoned Mines

FIELD ID: Silver Dyke Tails, Tailings Sample #2 Tails Above Failed Pond--09/19/90

LAB NO: S2719

DATE RECEIVED: 09-24-90

pH (1:1 slurry) 6.68 SU

Total Metals

As	184	mg/Kg
Cd	14	mg/Kg
Cu	2140	mg/Kg
Fe	41,000	mg/Kg
Pb	5140	mg/Kg
Zn	1450	mg/Kg

DATE: October 29, 1990

CLIENT: Abandoned Mines

FIELD ID: Silver Dyke Coarse Tails, Big Dump Below and West of Mine
09/09/90

LAB NO: S2716

DATE RECEIVED: 09-24-90

pH (1:1 slurry) 8.26 SU

Total Metals

As	166	mg/Kg
Cd	22	mg/Kg
Cu	1910	mg/Kg
Fe	44,600	mg/Kg
Pb	5160	mg/Kg
Zn	2580	mg/Kg

DATE: October 29, 1990

CLIENT: Abandoned Mines

FIELD ID: Silver Dyke Tailings at Carpenter Creek--08/14/90

LAB NO: S2700

DATE RECEIVED: 09-24-90

pH (1:1 slurry) 6.88 SU

Total Metals

As 263 mg/Kg

Cd 31 mg/Kg

Cu 4310 mg/Kg

Fe 41,700 mg/Kg

Pb 12,500 mg/Kg

Zn 1020 mg/Kg

DATE: November 15, 1990

CLIENT: Abandoned Mines

FIELD ID: Carpenter Creek Upstream from Silver Dyke Tailings

LAB NO: W8632

DATE RECEIVED: 09/24/90

Hardness 43 mg/L as $CaCO_3$

Total Metals

As <0.001 mg/L

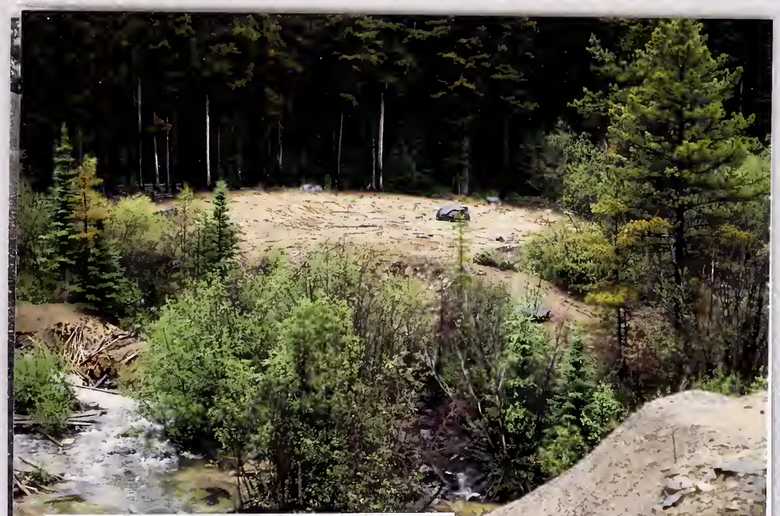
Cd <0.0001 mg/L

Cu <0.02 mg/L

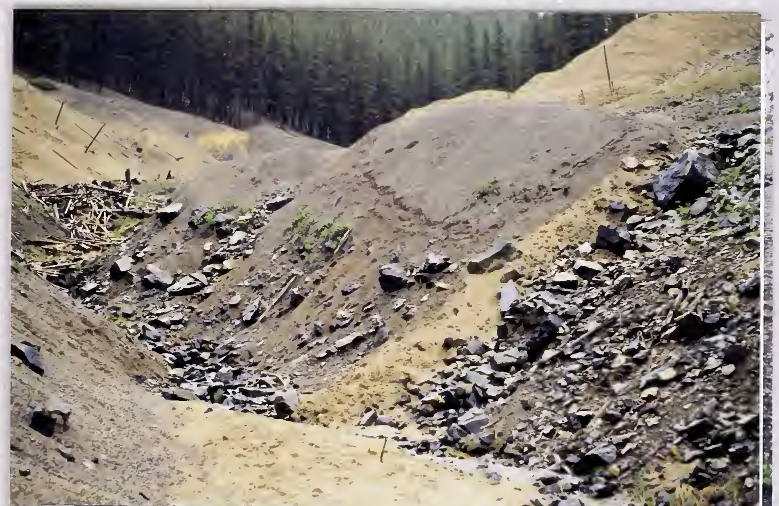
Fe <0.04 mg/L

Pb <0.001 mg/L

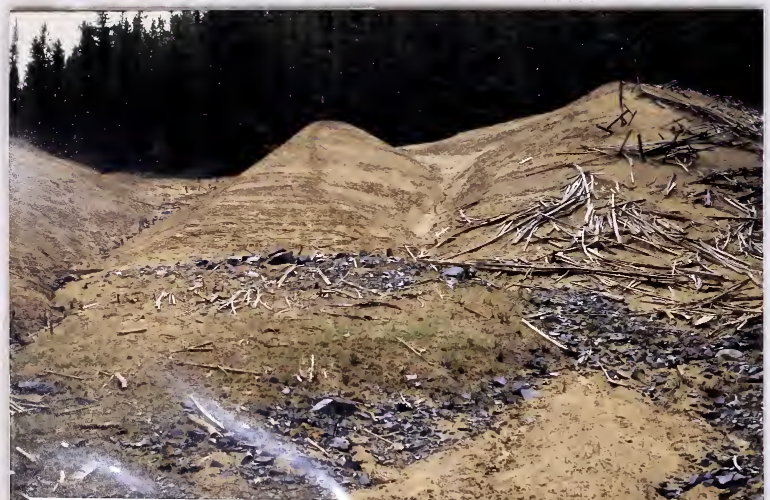
Zn <0.01 mg/L



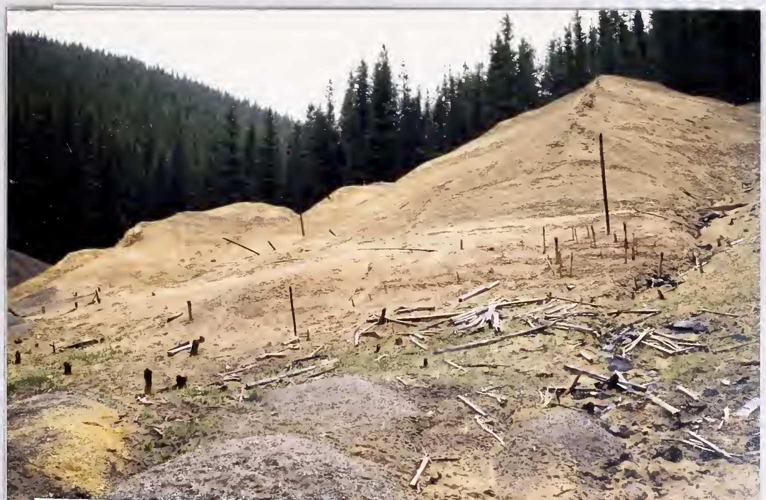
07-137, #12: TP-5 across Carpenter Creek



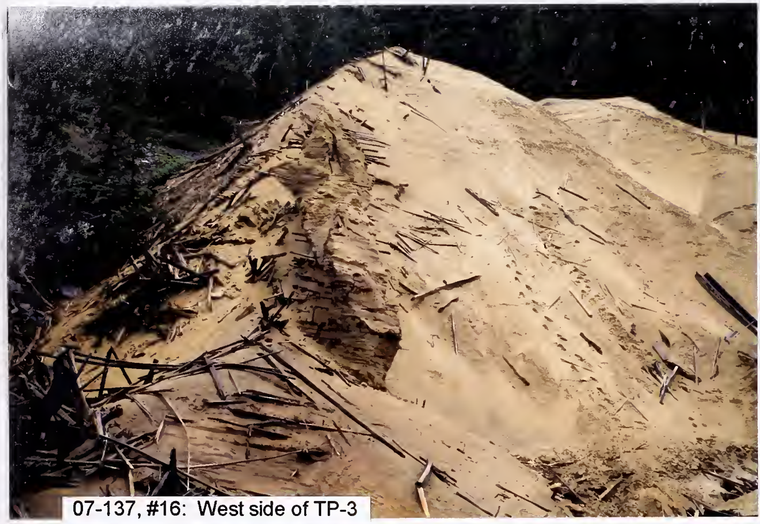
07-137, #13: TP-4 (coarse tails)



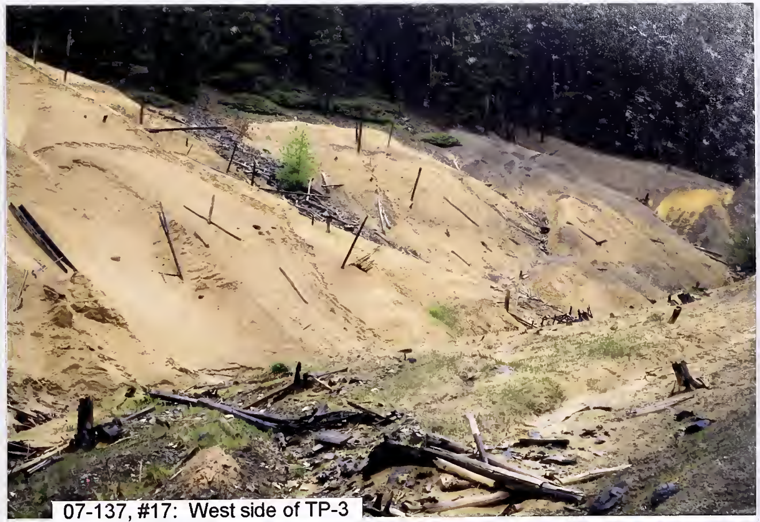
07-137, #14: East side of TP-3



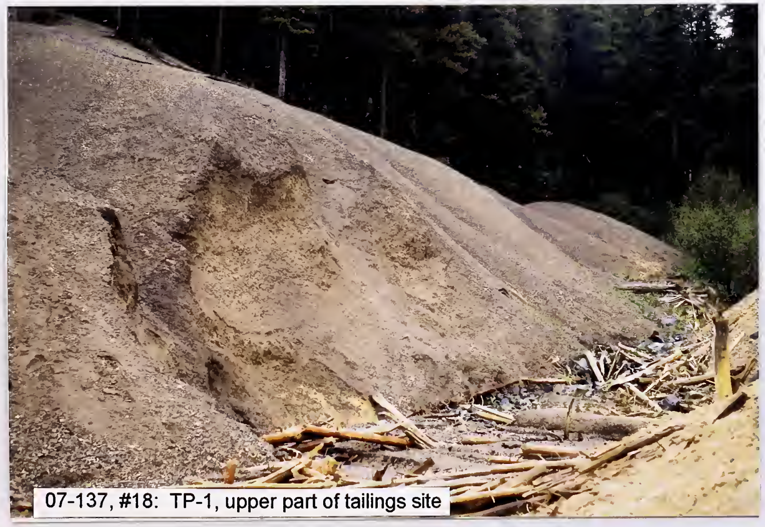
07-137, #15: East side of TP-3



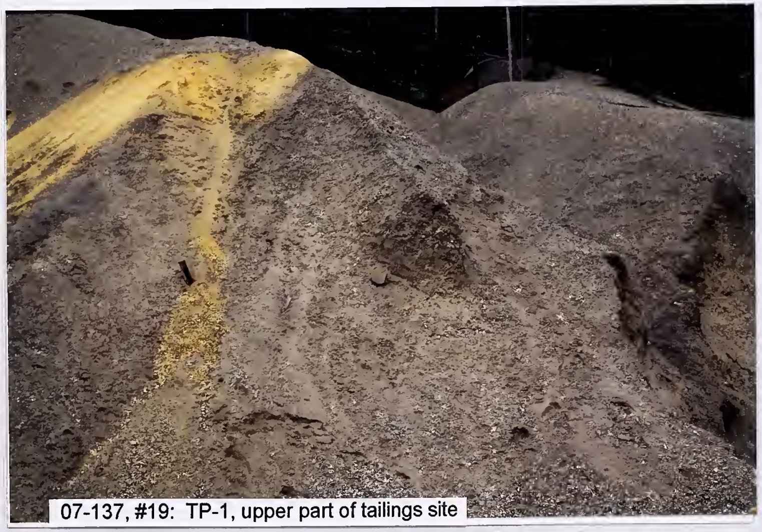
07-137, #16: West side of TP-3



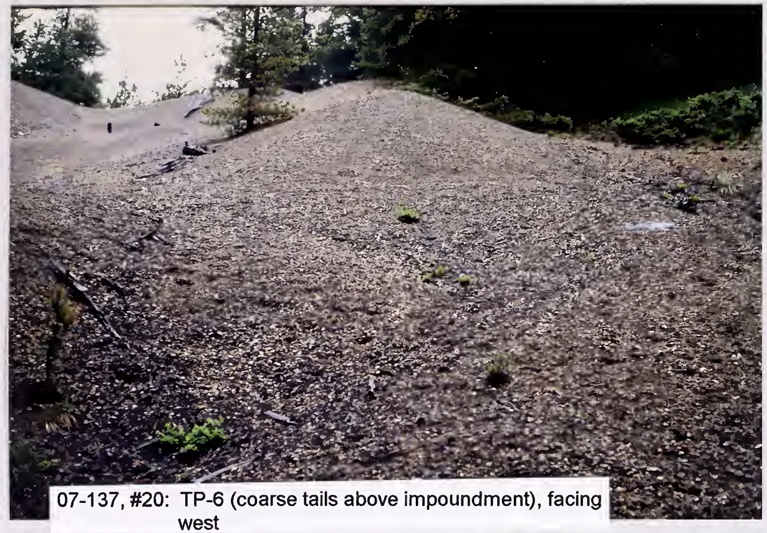
07-137, #17: West side of TP-3



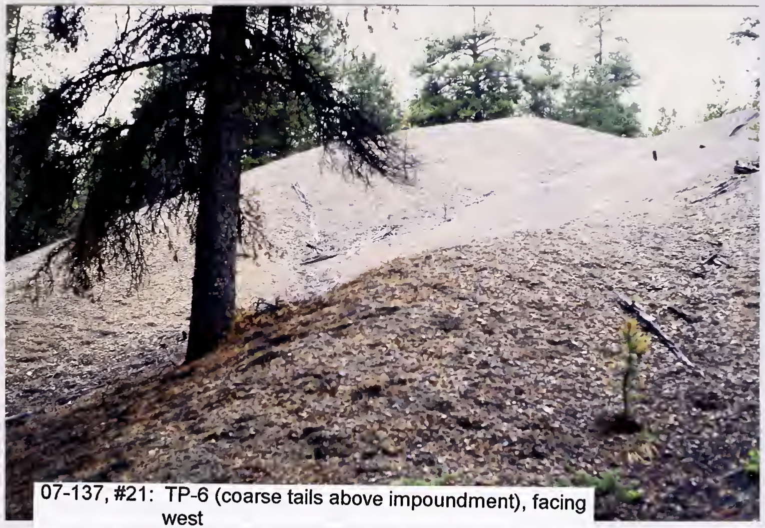
07-137, #18: TP-1, upper part of tailings site



07-137, #19: TP-1, upper part of tailings site



07-137, #20: TP-6 (coarse tails above impoundment), facing west



07-137, #21: TP-6 (coarse tails above impoundment), facing west

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: SILVER DYKE MILL **PA#:** 07-138

Date: May 25, 1993 **Time:** 1430

Field Team Leader: Tuesday, Pioneer

Sampling Personnel: Belanger, Flammang, Clark,
Lasher; Pioneer
Pierson; TD&H

Visitors: None

Weather/Seasonality Observations: Partly cloudy, slight breeze, 65°F; cool, wet spring.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #27: WR-1; #28: Mill remnants; #29,#30: WR-2; #31,#32: WR-3; #33: Tailings pile #1 (from above); #34: Mill and tailings pile #2 (from below); #35: WR-1, -2, -3 (from below). Video Tape No. 1

General Comments/Observations (not covered specifically in attached Inventory Forms): N/A

Other Hazardous Materials/Substances Present: Asbestos may be present at millsite associated with old bearings and rollers.

General Comments on Potential Remedial Alternatives: May combine remediation with the Silver Dyke Adit; could possibly place waste rock in pit above Silver Dyke Adit. Revegetation of waste rock piles would be difficult due to large rocks and sulfides; contour and revegetate. Demolish mill foundations for safety.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): SILVER DYKE MILL **PA#:** 07-138

Legal Description: T 14N ;R 8E ;Sec. 15 , NE1/4 NW1/4 ___1/4

County: CASCADE **Mining District:** NEIHART

Latitude: N 46° 58' 42" **Longitude:** W 110° 41' 55"

Primary Drainage Basin and Code: Belt Creek/10030105
Secondary Drainage Basin: Squaw Creek

USGS Quadrangle map name(s): Neihart

Mine Type/Commodities: Hardrock/Silver, Lead, Zinc

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Private
Owner, Agent, or Contact (Include address and phone when available): Peter Antonioli, Alexandra Resources Co., P.O. Box 791, Butte, MT 59702. (406) 723-8730.

Relationship to other mines/sites in the area/district: Close to Silver Dyke Adit, 1/3 mi to NE; Silver Dyke Tailings, 1/4 mi to West; Sherman #2 across Carpenter Crk. from Squaw Crk.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 6800' , Slope Approx. 30° , Aspect West

Land use: Mining X , Recreational X , Residential___, Urban___, Agricultural___, Other(Specify)

Area of disturbed/unvegetated lands? 16 acres.
Dimensions: 1,000 feet x 700 feet

Predominant vegetation types: Lodgepole forest on surrounding slopes; some wild rose plants and raspberries.

Access: roads - good X ,poor___,4wd X ,trail___.
Other logistical considerations (proximity to other sites). Access to Silver Dyke Adit is off of same road; Carp. Crk. Road (access to Squaw Crk.) has several sites on it.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are no well logs in MBMG well log database within a 1 mile radius. However, there is a residential well within 1,500 feet and is 260 feet deep.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). The site lies on the east side of the intermittent drainage, Squaw Creek, which drains into perennial Carpenter Creek about a mile down from the site.

Mining/milling history, ore type/tenor, host rock, gangue: Mill was built in 1921; 500-ton floatation to handle 1,000,000 tons of ore. In 1926, capacity was increased to 950 tons; mill and mine permanently shut down. Minerals occurred as disseminations in brecciated mass of quartz porphyry, granite porphyry and gneiss. Production from 1921 to 1948 was 1,167,125 tons or ore; 1,736 oz of Au; 3,177,068 oz of Ag; 7,453,527 lbs of Cu; 16,367,760 lbs of Pb; and 8,428 lbs of Zn. Ore was a mix of both sulfide and oxide or carbonate minerals disseminated in gangue of altered quartz porphyry and gneiss. Minerals were galena, cerussite, pyrite, chalcopyrite, malachite, azurite, Fe oxides and small amounts of sphalerite. Ore contained about 20% kaolin.

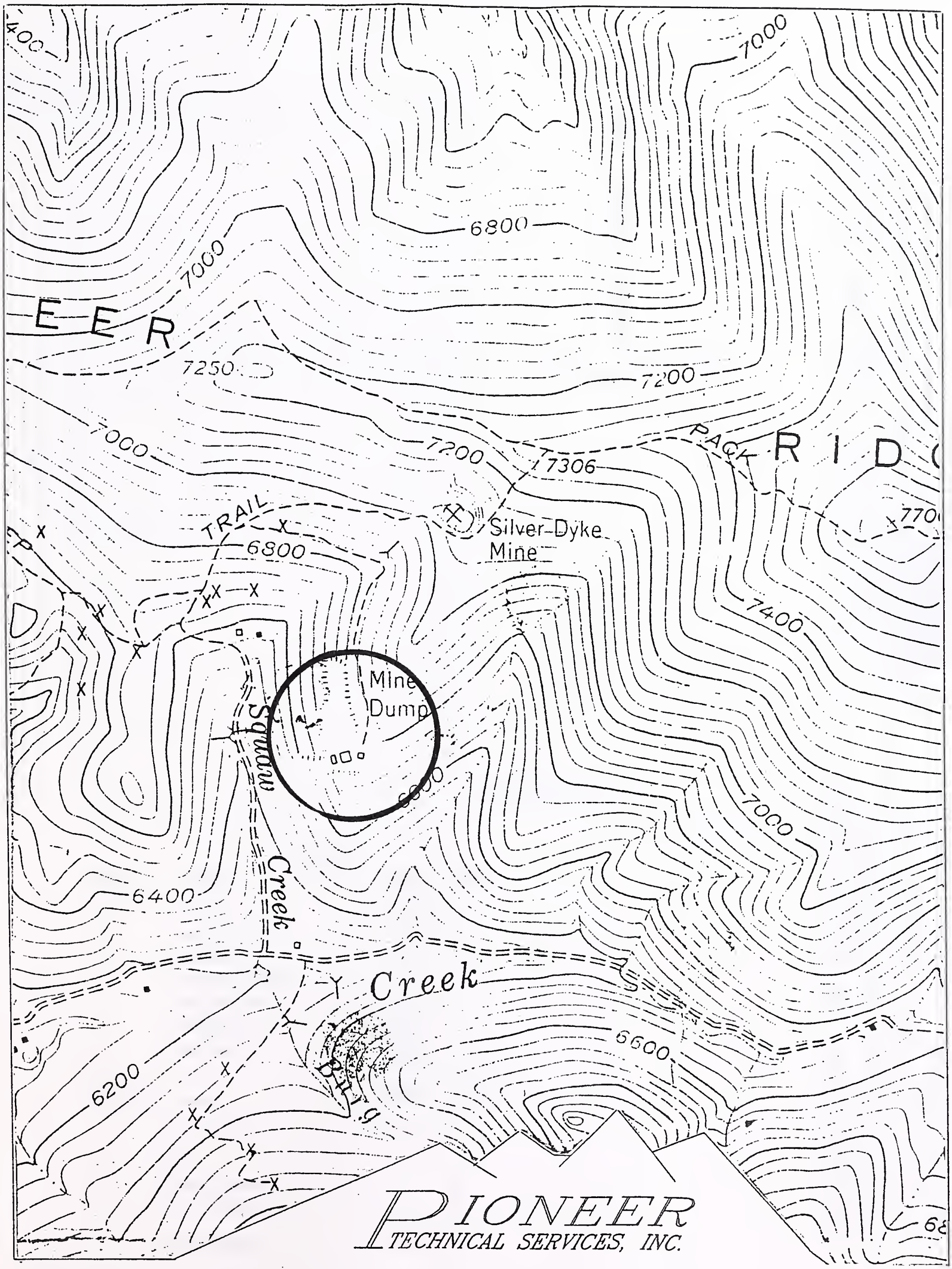
Mine Operation?
Shafts - Yes___, No X , # ____, Comment
Adits - Yes___, No X , # ____, Comment
Pits - Yes___, No X , # ____, Comment
Placers - Yes___, No X , # ____, Comment
Other - Yes___, No X , # ____, Comment

Mill Operation? Yes X , No____. If yes answer the next three questions:

Period(s) of Operation: 1922-1929

Origin of Ore Milled - Custom Mill___ Dedicated Mill X ; Number and names of mines that supplied mill feed: Silver Dyke Mine

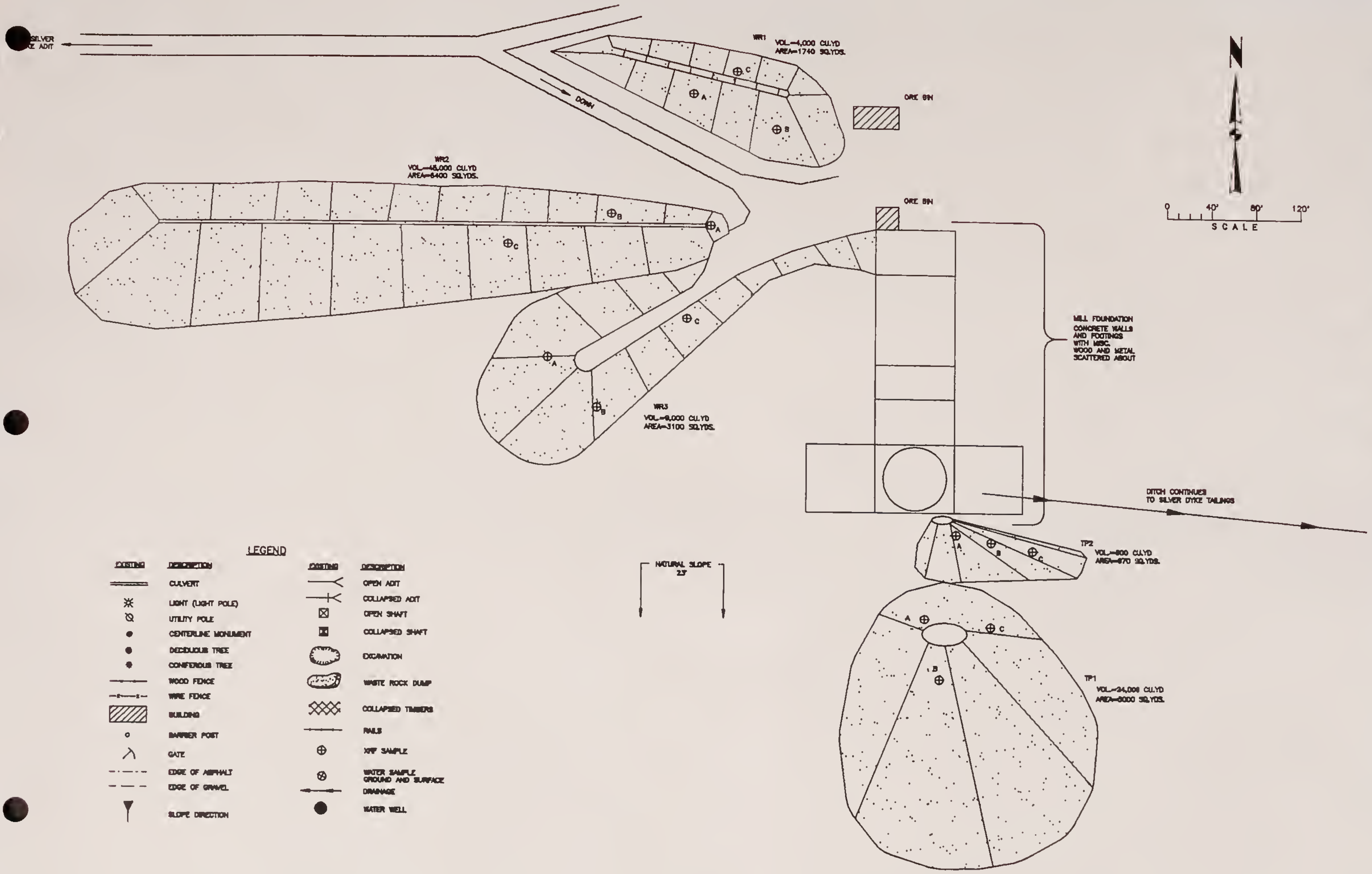
Process? Hg-amalgam, CN^- leach (vat, heap), floatation, smelting? Floatation; possibly coarse jigging or gravity separation. Tailings from this mill are at Silver Dyke Tailings site (07-137).



SILVER DYKE MILLSITE, P.A. NO. 07-138

T14N, R08E, SECTION 15

SCALE: 1" = 1000'



DRAWN JTP DATE 2 JUNE 93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

PIONEER TECHNICAL SERVICES, INC. BUTTE, MT.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

SILVER DYKE MILL PA# 07-138
NEIHART DISTRICT CASCADE COUNTY

SHEET NO.

07-138.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution(approximate % sand, silt, & clay): No tailings present on-site; Silver Dyke and Carpenter Creek tailings originated here (see other site files).

Determine tailings impoundment depth and describe stratification of the tailings if observable(based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment(Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Tuesday, Belanger, Pierson, Flammang, Lasher

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	4,000	By ore bin at top of site by road; west side	None	3.42 (S)	0.04	07-138-WR-1	05/25/93 1920	T-Metals, ABA
WR-1B	WR		By ore bin at top of site by road; south side	None	< 3.5 (D)	NM			
WR-1C	WR		By ore bin at top of site by road; east side	None	4.0 (D)	NM			
WR-2A	WR	45,000	Longest dump at site, north of mill; east end	None	6.24 (S)	0.05	07-138-WR-2	05/25/93 1920	T-Metals, ABA
WR-2B	WR		Longest dump at site, north of mill; northeast side	None	NM	NM			
WR-2C	WR		Longest dump at site, north of mill; southeast side	None	NM	NM			
WR-3A	WR	9,000	Just below WR-2, partially hooked onto it; west corner	None	NM	NM			
WR-3B	WR		Just below WR-2, partially hooked onto it; southeast corner	None	NM	NM			
WR-3C	WR		Just below WR-2, partially hooked onto it; east side near end	None	NM	NM			
TP-1A	TAIL	24,000	Large dump below mill, TP-2 to the west; northwest corner	None	5.95 (S)	0.05	07-138-TP-1	05/25/93 1930	T-Metals, ABA
TP-1B	TAIL		Large dump below mill, TP-2 to the west; south face	None	NM	NM			
TP-1C	TAIL		Large dump below mill, TP-2 to the west; east side	None	NM	NM			
TP-2A	TAIL	600	Small dump below mill to the south; south face just below top	None	NM	NM			
TP-2B	TAIL		Small dump below mill to the south; east of TP-2A	None	NM	NM			
TP-2C	TAIL		Small dump below mill to the south; east end near middle	None	NM	NM			

*D-Direct reading (Kelway Meter); S-Saturated Paste (Orion Meter)

Comments or deviations from SOPs: 07-138-WR-1 is composite of WR-1A through -1C. 07-138-WR-2 is composite of WR-2A through -2C, and WR-3A through -3C. 07-138-TP-1 is composite of TP-1A through -1C, and TP-2A through -2C. NM = Not Measured

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No X , Number:____ Identification:________________

Filled shafts: Yes___, No X , Number:____ Identification:________________

Seeps/Springs: Yes___, No X , Number:____ Identification:________________

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 22

Distance to nearest well used for drinking? Approx. 1/4 mile upgradient of site in Squaw Gulch

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible X , Unlikely____.
No water seen on site. Water table may be affected below tailings pile/waste rock piles. Uncontained wastes high in metals and sulfides.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: ______

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______

MDSL AMRB/PIONEER 4/9/93

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X, No ___, Name(s): Squaw Creek is approx. 50 feet below the base of site wastes.

Dry streambeds: Yes ___, No X, Name(s): ___

Other surface water: Yes ___, No X, Name(s)/Description: ___

Waste materials within any floodplain: Yes ___, No X Source ID(s): ___

Approximate Flood frequency? ___1 yr, ___10 yr, ___100 yr

Estimated seasonal flow of stream(s) (cfs)? N/A
High Flow: ___, Average Flow: ___

Distance between waste source(s) and nearest surface water body (ft)? Approx. 50 feet from base of TP-1 to Squaw Crk. Did not sample Squaw Crk. for mill; sampled for Silver Dyke Adit.

Surface water draining onto or through waste sources: Yes ___, No X,
Describe: TP-1 and WR-2 show evidence of water carrying sediment off base of pile. There are dry channels on either side of TP-1 that may have carried water at some time; no water now during peak of runoff, material is fairly coarse, probably mostly infiltrating.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Squaw Creek has none; Carpenter Creek has wetlands; Belt Creek has fishery, agriculture, recreation, and residential.

Observed erosional/sedimentation/stream turbidity problems? Yes X, No ___, Distance downstream (ft)? ___ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): Some erosion of waste rock (tailings) into creek, but already severly impacted by Silver Dyke Adit.

SURFACE WATER INVENTORY FORM

SAMPLERS: __________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.											

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): See Silver Dyke Adit (07-135) for samples and information from Squaw Creek sampling.

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? There is a lot of waste at the site with little room to move around and on a relatively steep slope.

Wetlands present: Yes___, No_X_, Describe:___

Carbonate rocks/soils: Yes___, No_X_, Describe:___

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100_X_; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments___

Nearest residence(ft or miles)? 1,500 feet

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Tuesday, Belanger, Pierson, Flammang, Lasher

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	SO3; pH	Dry	15,660	15,660	Yes	Low
WR-2	SO3	Dry	57,600	57,600	Yes	Low
WR-3	SO3	Dry	27,900	27,900	Yes	Low
TP-1	SO3	Dry	45,000	45,000	Yes	Moderate
TP-2	SO3	Dry	7,830	7,830	Yes	Moderate

Notes and Clarifications: ______

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No X ,
Describe:__________

Population within 1 mile: 1-10 X ; 10-30___; 30-100___; 100-300___;
300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments__________

Evidence of recreational use on site: Yes X , No___, Describe: Beer cans; however, road did not appear to be used frequently.

Accessibility - Fences, warning signs, closed roads? Unrestricted

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No X , Comment__________
Wilderness Area - Yes___, No X , Comment__________
T&E Species Habitat - Yes___, No X , Comment__________
Bat Habitat - Yes___, No X , Comment__________

Primary Drainage___; Secondary Drainage X ; No Information___:

Riparian Habitat Quality - High___, Medium X , Low___
Wetlands Frontage - High___, Medium___, Low X
Fisheries Habitat and Species Classification - 6
Sport Fishery Classification - 6

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes___, No X , Number____, types and locations:___

Hazardous structures: Yes X , No___, Number 3 , types and locations: Two large collapsing wood structures (ore bins); concrete foundations/wall with lots of timbers and old machinery in; one building with rod iron plate (25'x40') buckled on cement floor with concrete walls (see site sketch).

Unstable highwalls, pits, trenches, slopes: Yes___, No X , Number____,
types and locations:__________

Unstable waste piles, impoundments, undercut banks: Yes X , No____, Number 5 , types and locations: Three waste rock piles with steep sides, WR-1, -2, -3; two tailings piles, TP-1 being the larger, steep slopes, and at angle of repose.

Fire and/or Explosion hazards: Yes___, No X , Explain:__________

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for the Silver Dyke Mill, Prepared by Chen-Northern, October 12, 1989.

USBM, Mines and Mineral Deposits (Except Fuels), Cascade County, Montana, Information Circular 7589, Written by Almon F. Robertson, Competed in April, 1950, pp. 55-56.

USGS, Topographic Map, Neihart, Montana, 7 1/2 minute Quadrangle, 1961.

LABORATORY ANALYTICAL DATA

SILVER DYKE MILLSITE
PA NO. 07-138

MDSL AMRB/PIONEER 4/9/93

Silver Dyke Mill PA# 07–138
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – TUESDAY
INVESTIGATION DATE: 05/25/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
07–138–TP–1	69.8	104 J	12.7 JX	13.4 J	12.1	2120	41700	0.023	5050 J	40.9 J	4830 J	3.03 UJ	1510 J	NR
07–138–WR–1	182	289 J	17.3 JX	7.88 J	13	2140	58900	0.366	996 J	13.4 J	8430 J	3.21 UJ	2300 J	NR
07–138–WR–2	111	450 J	40.8 JX	11.6 J	7.57	3730	39200	0.291	3610 J	28.2 J	8220 J	3.17 UJ	4380 J	NR
BACKGROUND	10.5	131	1.4	6.83	22.2	26.1	20600	0.048 U	607	15.6	667	3.39 UJ	548	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
07–138–TP1	1.26	39.4	17.9	–21.5	<0.01	0.47	0.80	14.7	3.20
07–138–WR1	3.08	96.2	–18.8	–115	1.61	0.41	1.06	12.8	–31.7
07–138–WR2	2.17	67.8	19.1	–48.7	0.60	0.67	0.90	20.9	–1.84

LEGEND

TP1 – Composite of subsamples TP1A, 1B, 1C, 2A, 2B, and 2C.
WR1 – Composite of subsamples WR1A, 1B, and 1C.
WR2 – Composite of subsamples WR2A, 2B, 2C, 3A, 3B, and 3C.
BACKGROUND – From the Silver Dyke Adit (07–138–SS–1).

XRF ANALYSIS RESULTS

SILVER DYKE MILLSITE
PA NO. 07-138

MDSL AMRB/PIONEER 4/9/93

Mine Name: Silver Dyke Mill PA# 07-138
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
07-138-TP1-A		15829	2821.13	2631.21		4470.86	33036.6		2138.57	971.826		119.324
07-138-TP1-B		17298.3	2117.68	1968.6			25481.7		1477.76	231.249		153.167
07-138-TP1-C		15305	6774.16	2376.27		8355.98	38850		999.94	2205.38		128.604
07-138-TP2-A		18546.7	2007.53	1169.43		2389.1	19717.5		2184.39	1283.56		118.104
07-138-TP2-B		20022.2	2084.51	944.982 *			36456.6		956.455	353.535		143.86
07-138-TP2-C		20030.8	6548.38	2265.55		933.128 *	48808.2		737.808	1356.56		67.2771
07-138-TP-1		14890.6	4162.31	2202.96		4720.87	31676.5		1155.37	851.432		101.478
07-138-WR1-A		17929.6	2792.58	1961.49		2747.78	51743.5		3437.96	2738.97		74.8766
07-138-WR1-B		20030.8	6548.38	2265.55		933.128 *	48808.2		737.808	1356.56		67.2771
07-138-WR1-C		14579.5	2694.43	1785.85		3572.71	73633.3		1037.29	1878.12		123.098
07-138-WR2-A		18621	4994.36	1859.61		6516.46	31001.9		986.947	2096.01		79.4786
07-138-WR2-B		18810.9	3769.05	1560.87		7271.06	32634.9		698.677	2582.33		61.325
07-138-WR2-C		15705.2	2422.98	2187.87		2373.87	35147.2		5251	1817.13		82.4267
07-138-WR3-A		21764.5	4231.4	3065.26		12029.3	45489.1		4325.08	2888.49		113.514
07-138-WR3-B	459.463 *	20584.5	5409.62	3636.99		12458.5	47120.7		2363.01	3602.6		113.712
07-138-WR3-C		14972.1	4421.84	2665.06		8696.46	44259		331.198	1348.21		81.7319
07-138-WR-1		18874.1	4102.05	2114.82		1961.56	66851.2		2397.95	1974.26		87.2678
07-138-WR-2		18303.9	3574.76	2099.75		3727.73	25780.7		2267.1	1532.76		73.5507

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
07-138-TP1-A	101.023		6.82609 *	3871.9	167.261			952.233	114.962 *		44.1628 *
07-138-TP1-B	118.616			3036.83	155.516			1081.67		18.4991 *	48.3702 *
07-138-TP1-C	165.702			1316.66	173.619			692.613			
07-138-TP2-A	113.327		113.263	1186.85	190.858			938.767		20.141 *	61.495
07-138-TP2-B	204.854		57.0219	1708.57	194.831			1214.19		23.4837 *	37.2641 *
07-138-TP2-C	83.395			4410.28	285.706			1135.71	137.517 *		32.2336 *
07-138-TP-1	165.078		8.0831 *	1869	150.491			743.849	53.9058 *		31.5322 *
07-138-WR1-A	102.656		12.6394 *	6916.92	264.515		58.6326 *	1572.02	183.957 *		89.6816
07-138-WR1-B	83.395			4410.28	285.706			1135.71	137.517 *		32.2336 *
07-138-WR1-C	133.043			3893.5	227.757			1333.82	104.4 *		27.7842 *
07-138-WR2-A	106.649			3329.79	189.656			1146.71			30.1594 *
07-138-WR2-B	114.369		5.91062 *	3390.73	211.163			1430.75			36.5769 *
07-138-WR2-C	114.561		38.4502	7229.92	223.31			1910.83			47.5475 *
07-138-WR3-A	151.739			6579.74	243.808			987.841	135.65 *		50.599 *
07-138-WR3-B	168.43			4371.53	236.317	228.633 *		1261.21	108.732 *		35.7465 *
07-138-WR3-C	128.651			1322.8	257.545			609.483	58.7197 *		
07-138-WR-1	142.613		11.3628 *	7323.28	293.15			1176.64	174.593 *		37.25 *
07-138-WR-2	126.46		6.04012 *	3438.06	212.592			1448.88	151.692 *		26.2132 *

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

SILVER DYKE MILLSITE
PA NO. 07-138

AIMSS SCORESHEET

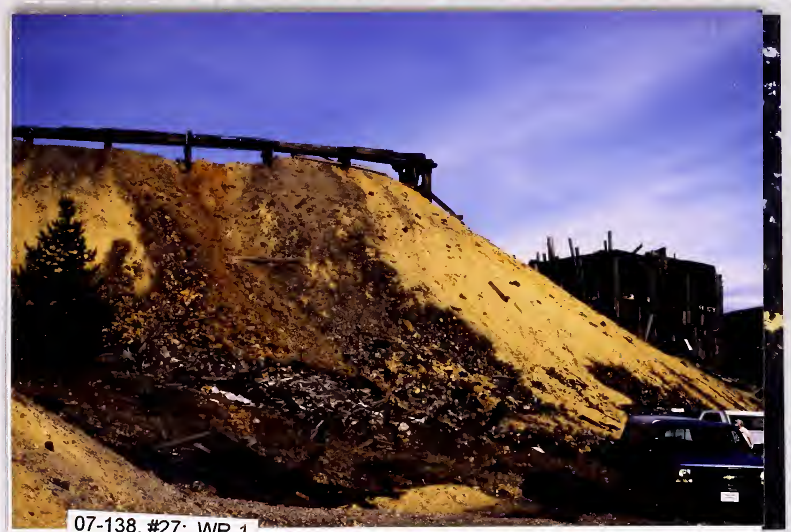
SITE NAME: SILVER DYKE MILL
PA NUMBER: 07-138

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		10
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	200
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	200
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	297.755
6	GW - TARGETS	WELLS - 1 MI. x 2.5		2.5
7		WELLS - 1 TO 4 MI		21
8		NEAREST WELL		5
9		TARGETS SCORE	LINES 6 + 7 + 8	28.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	1697204
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		10
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	200
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	200
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	329.452
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		0
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 - 22	17
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	1120137
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		15
26B		DISTANCE TO POPULATION		10
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	150
27		LIKELIHOOD SCORE	LINES 25 + 26C	150
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	2.204
29	AIR - TARGETS	POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		5
31		WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 - 33	35
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	11571
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		50
37A		ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		10
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	200
38		LIKELIHOOD SCORE	LINES 36 + 37C	250
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	1.992
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		1
41		NEAREST RESIDENCE		5
42		RECREATIONAL USE		2
43		TARGETS SCORE	SUM LINES 40 - 42	8
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	3984
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**28.33**

SITE NAME: SILVER DYKE MILL
PA NUMBER: 07-138

SITE SAFETY

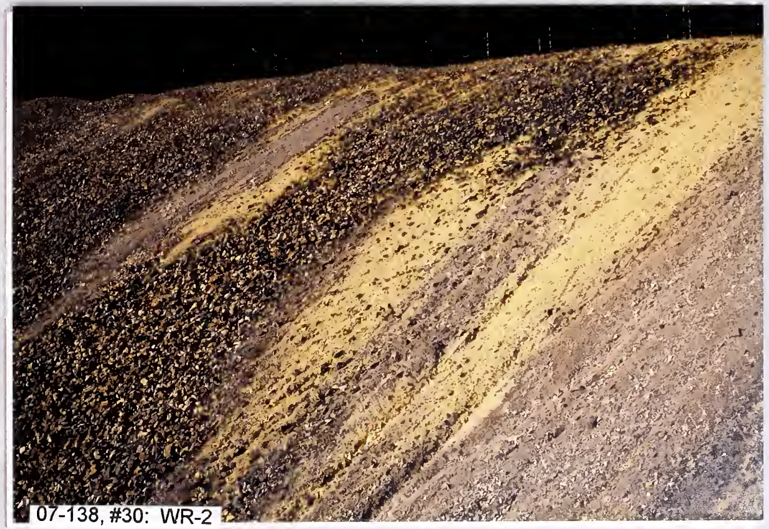
LINE NO.				
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	120
6		EXPLOSIVES		0
7		HAZ. MATERIALS		100
8		HAZARDS SCORE	SUM LINES 2 - 7	220
9		POPULATION - 1 MILE		1
10	TARGETS	NEAREST RESIDENCE		5
11		RECREATIONAL USE		2
12		TARGETS SCORE	SUM LINES 9 - 11	8
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**35.20**



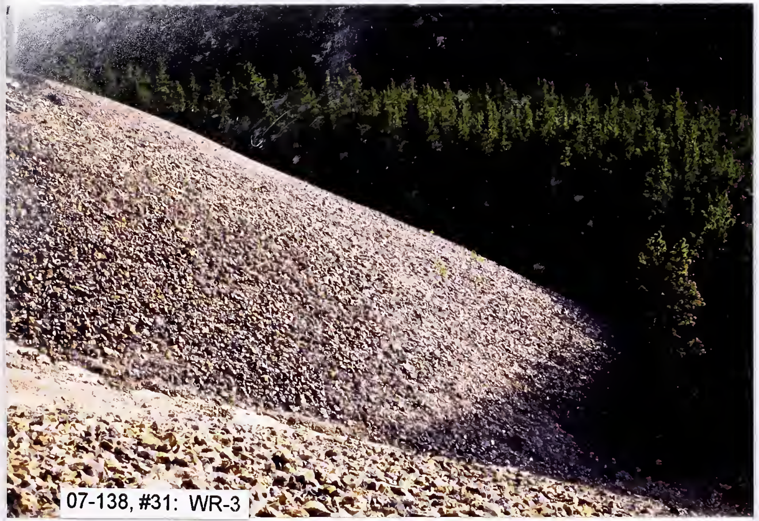
07-138, #27: WR-1

07-138, #28: Mill remnants

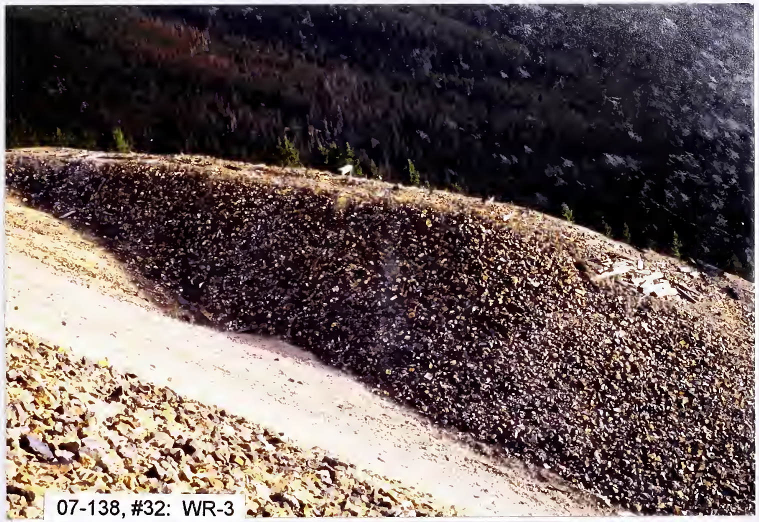
07-138, #29: WR-2



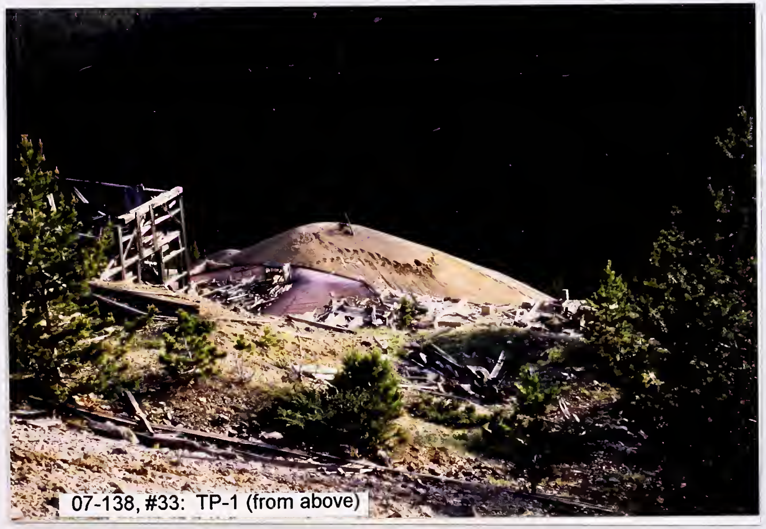
07-138, #30: WR-2



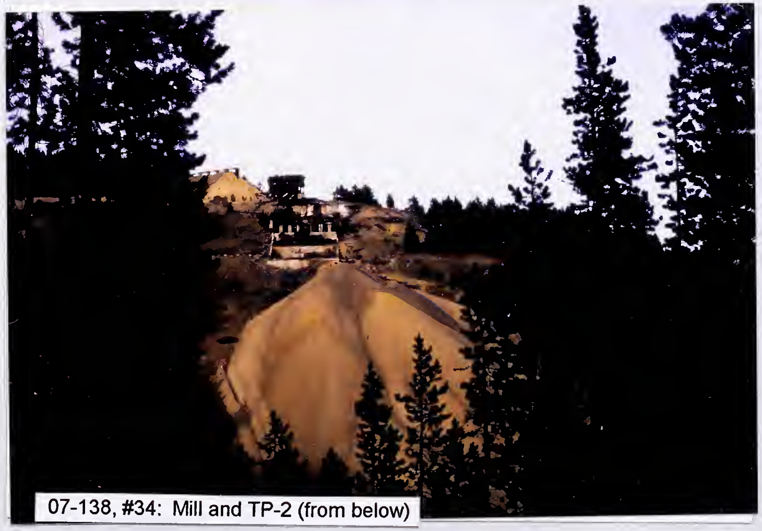
07-138, #31: WR-3



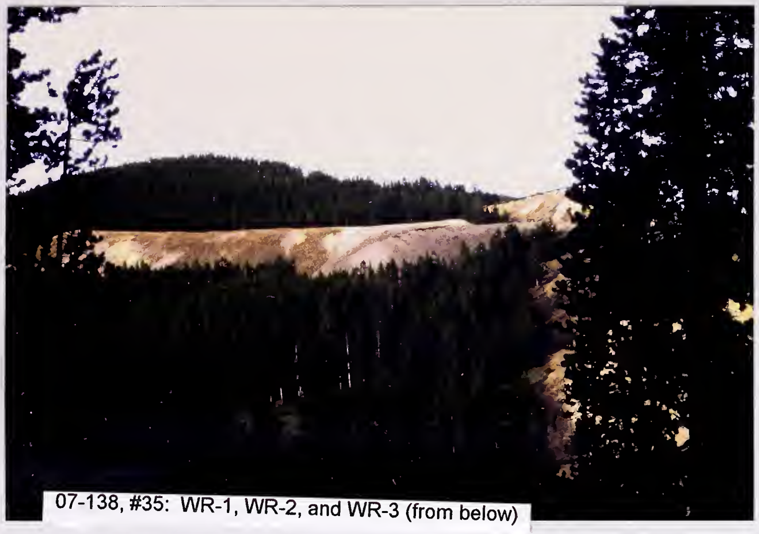
07-138, #32: WR-3



07-138, #33: TP-1 (from above)



07-138, #34: Mill and TP-2 (from below)



07-138, #35: WR-1, WR-2, and WR-3 (from below)

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: SHERMAN NO. 2 (Northeast) PA#: 07-140

Date: May 26, 1993 Time: 1800

Field Team Leader: Tuesday, Pioneer

Sampling Personnel: Pierson, TD&H

Visitors: Earl McCurley, MDSL

Weather/Seasonality Observations: Partly cloudy; Occasional rain; Approx. 40°F; cool, wet spring.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #22: Adit from Carpenter Creek (60 feet east); #23: Adit from 20 feet east of opening. Video Tape No. 1

General Comments/Observations (not covered specifically in attached Inventory Forms): Adit only with no associated waste rock dump; adit is HMO. Tailings in Carpenter Creek floodplain are from upstream Silver Dyke blowout.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Close adit. Move or revegetate tailings from Silver Dyke in floodplain.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): SHERMAN NO. 2 PA#: 07-140

Legal Description: T 14N ;R 8E ;Sec. 15 ,NW 1/4SW 1/4 1/4

County: CASCADE Mining District: NEIHART

Latitude: N 46° 58' 27" Longitude: W 110° 41' 52"

Primary Drainage Basin and Code: Belt Creek/10030105
Secondary Drainage Basin: Carpenter Creek

USGS Quadrangle map name(s): Neihart

Mine Type/Commodities: Hardrock/Silver, Lead, Zinc, Copper

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Private/Public
Owner, Agent, or Contact(Include address and phone when available): Peter Antonioli, Alexandra Resources Co., P.O. Box 791, Butte, MT 59702. (406) 723-8730; Lewis and Clark National Forest.

Relationship to other mines/sites in the area/district: Near the Savage Mill, Minute Man and other Sherman No. 2 mines, and the Silver Dyke Tailings.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 6200' , Slope 15° ,
Aspect North

Land use: Mining X , Recreational X , Residential___, Urban___, Agricultural___, Other(Specify)

Area of disturbed/unvegetated lands? 0 acres.
Dimensions: 4 feet x 4 feet adit opening only

Predominant vegetation types: Lodgepole pine, willow, kinniKinick, shrubs

Access: roads - good___,poor X ,4wd___,trail X .
Other logistical considerations (proximity to other sites). Hike from the north bank of Carpenter Creek.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are no well logs listed in MBMG well log database within a 1 mile radius. However, there is a residence with a well located 0.5 mile north of the site.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies on the south side of the perennial Carpenter Creek, on the edge of the floodplain. Carpenter Creek flows west past the site and to the southwest to confluence with Belt Creek, which is the major drainage for the area. The confluence is approx. 3 1/2 miles downstream. The site is underlain by Snow Creek porphyry and gray gneiss.

Mining/milling history, ore type/tenor, host rock, gangue: The claim was located in the 1880's and operated intermittently since that time. In 1949, the adit and shaft were reported to have caved. Ore mined contained as much as 46% lead, 36 to 40 ounces of silver a ton. Galena, sphalerite, pyrite, chalcopyrite, and silver sulfides are the principle sulfide minerals. Some cerussite is also present. Gangue minerals are calcite, limonite, ankerite, and quartz. The deposit was a fissure vein in Snow Creek porphyry and gray gneiss.

Mine Operation?

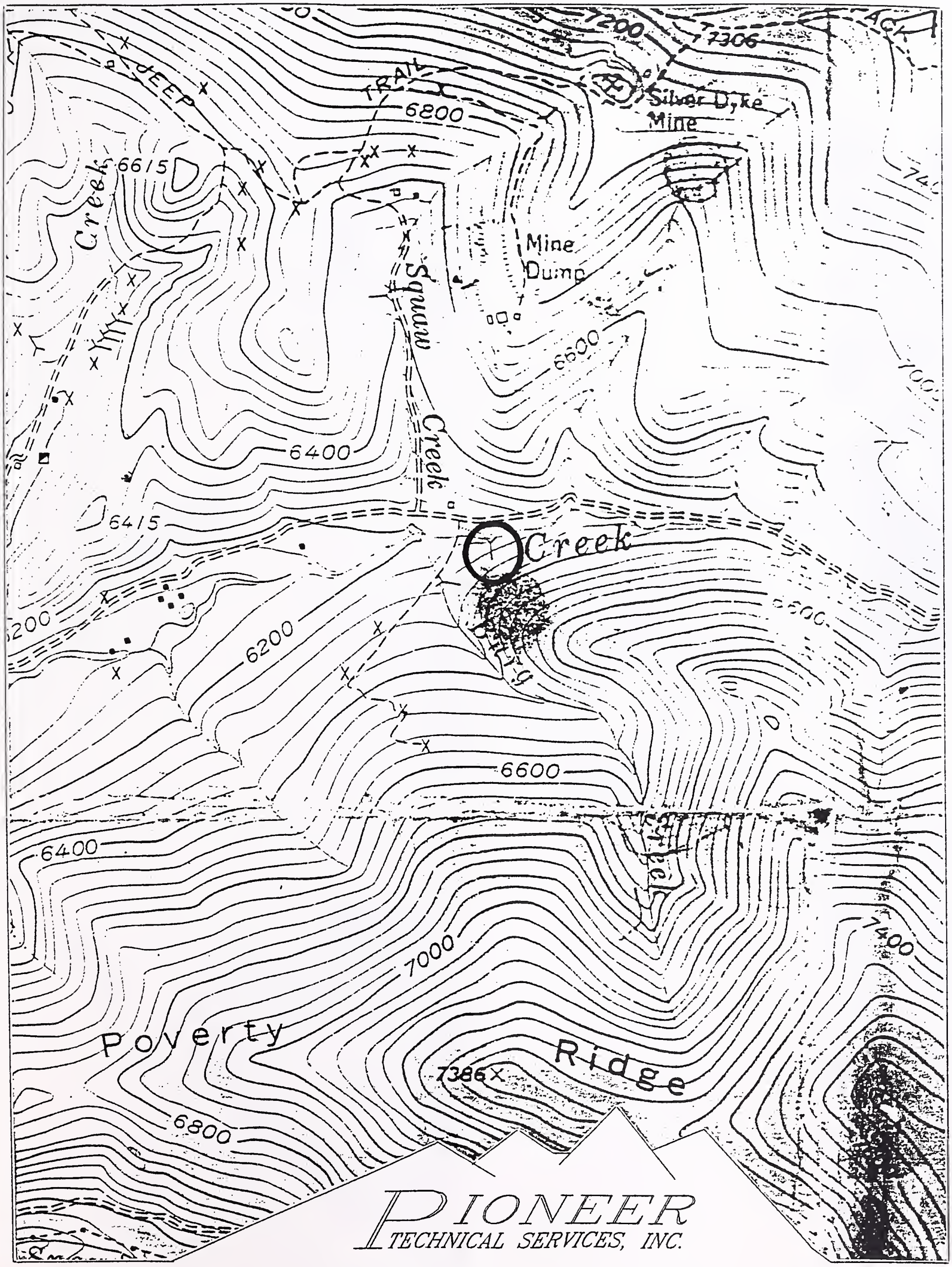
Shafts -	Yes	No X	#	Comment
Adits -	Yes X	No	# 1	Comment Open
Pits -	Yes	No X	#	Comment
Placers -	Yes	No X	#	Comment
Other -	Yes	No X	#	Comment

Mill Operation? Yes, No X. If yes answer the next three questions:

Period(s) of Operation: Mill was reported in literature, but no evidence of a mill was found on-site; Savage Mill is located across Carpenter Creek from this site.

Origin of Ore Milled - Custom Mill Dedicated Mill ; Number and names of mines that supplied mill feed: Small: some ore and dump material were milled.

Process? Hg-amalgam, CN^- leach (vat, heap), floatation, smelting? Reported to have been a bulk lead/zinc/silver concentrate on one large concentrating table.

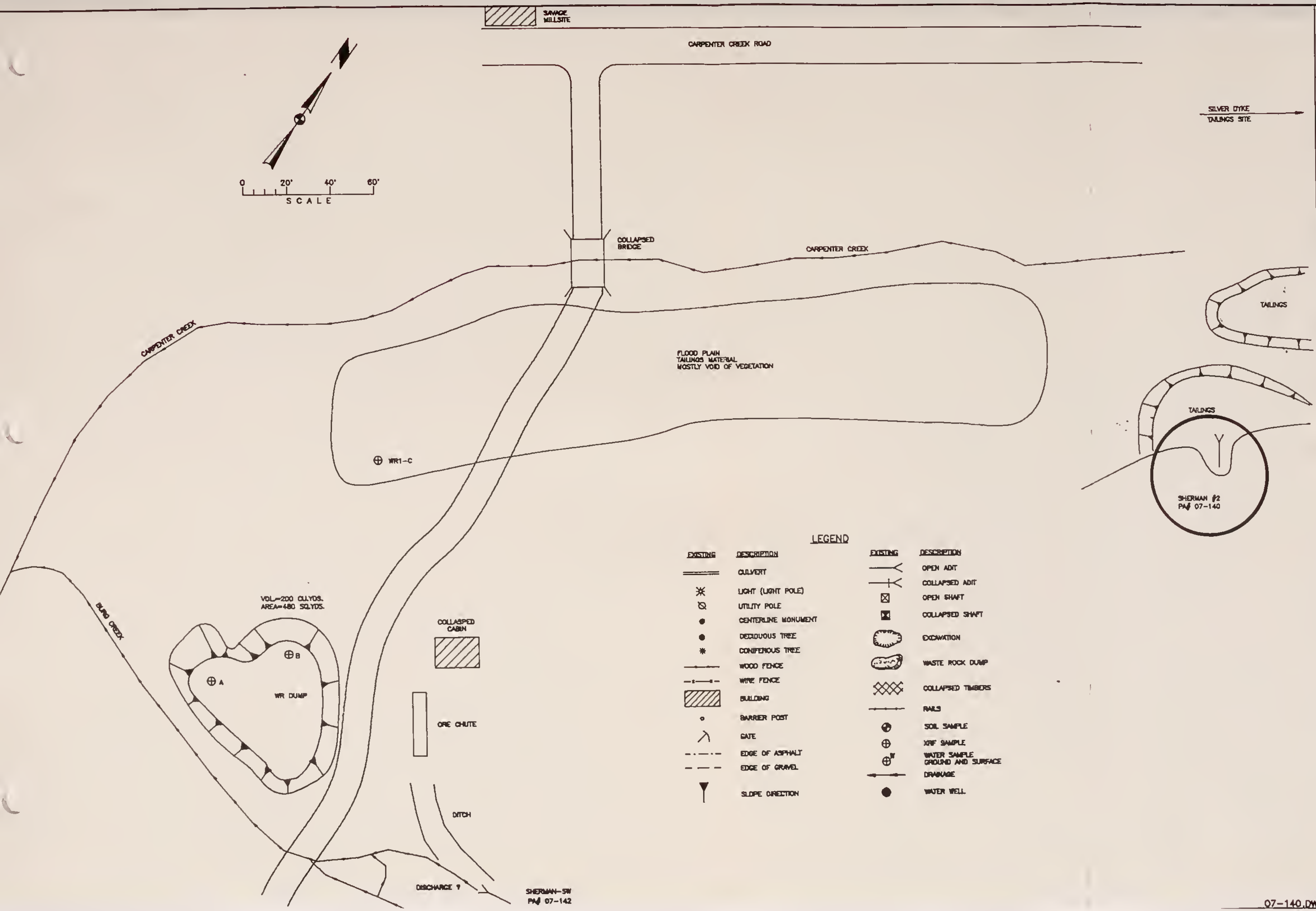


PIONEER
TECHNICAL SERVICES, INC.

SHERMAN #2, P.A. NO. 07-140

T14N, R08E, SECTION 15

SCALE: 1" = 1000'



DRAWN JTP DATE 15 JULY 93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

PIONEER TECHNICAL SERVICES, INC. BUTTE, MT.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

SHERMAN #2 PA# 07-140 & 07-142
NEIHART DISTRICT CASCADE COUNTY

SHEET NO.

07-140.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: ____________________

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.									

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: ____________________

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No X , Number:____ Identification:______________

Filled shafts: Yes___, No X , Number:____ Identification:______________

Seeps/Springs: Yes___, No X , Number:____ Identification:______________

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 21

Distance to nearest well used for drinking? Approx. 1 mile upgradient

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible____, Unlikely X .
Site is only an HMO adit with no dump associated with the adit.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: ______________________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______________________________

____

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes_X_, No___, Name(s): Carpenter Creek

Dry streambeds: Yes____, No_X_, Name(s):

Other surface water: Yes____, No_X_, Name(s)/Description:

Waste materials within any floodplain: Yes_X_, No___ Source ID(s): Tailings in Carpenter Creek floodplain from upstream.

Approximate Flood frequency?___1 yr,_X_10 yr,___100 yr

Estimated seasonal flow of stream(s) (cfs)? Approx. 60 cfs in spring.
High Flow: 70 cfs , Average Flow: 5-10 cfs

Distance between waste source(s) and nearest surface water body (ft)? No sources; adit is approx. 60 feet from Carpenter Creek.

Surface water draining onto or through waste sources: Yes____, No_X_, Describe:

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
N/A

Observed erosional/sedimentation/stream turbidity problems? Yes_X_, No_____, Distance downstream (ft)?________ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): Due to Silver Dyke Tailings in floodplain from upstream breach.

SURFACE WATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.											

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

____

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 1 to 2 acres

Wetlands present: Yes X , No ___, Describe: Carpenter Creek floodplain

Carbonate rocks/soils: Yes ___, No X , Describe: ___

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X ; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments___

Nearest residence(ft or miles)? 0.5 mile

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS:

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH /MODERATE/LOW/NONE)
No samples were taken.						

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No X ,
Describe:__________

Population within 1 mile: 1-10 X ; 10-30___; 30-100___; 100-300___;
300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments__________

Evidence of recreational use on site: Yes___, No X , Describe:________

Accessibility - Fences, warning signs, closed roads? Easily accessible by walking 300 feet from Carpenter Creek Road.

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No X , Comment__________
Wilderness Area - Yes___, No X , Comment__________
T&E Species Habitat - Yes___, No X , Comment__________
Bat Habitat - Yes___, No X , Comment__________

Primary Drainage___; Secondary Drainage X ; No Information___:

Riparian Habitat Quality - High___, Medium X , Low___
Wetlands Frontage - High___, Medium___, Low X
Fisheries Habitat and Species Classification - 6
Sport Fishery Classification - 6

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes X , No___, Number 1 , types and locations:
Adit

Hazardous structures: Yes___, No X , Number____, types and locations:_

Unstable highwalls, pits, trenches, slopes: Yes___, No X , Number____,
types and locations:__________

Unstable waste piles, impoundments, undercut banks: Yes____, No X ,
Number____, types and locations:__________

Fire and/or Explosion hazards: Yes___, No X , Explain:__________

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Sherman No. 2, Prepared by Chen-Northern, October 16, 1989.

USBM, Mines and Mineral Deposits (Except Fuels), Cascade County, Montana, Information Circular No. 7589, Written by Almon F. Robertson, April 1950, p. 58.

USGS, Topographic Map, Neihart, Montana, 7 1/2 minute Quadrangle, 1961.

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

SHERMAN #2 (NORTHEAST)
PA NO. 07-140

AIMSS SCORESHEET

SITE NAME: SHERMAN NO. 2 (NE)
PA NUMBER: 07-140

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		0
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	0
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	0
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.000
6	GW - TARGETS	WELLS - 1 MI. x 2.5		2.5
7		WELLS - 1 TO 4 MI		20
8		NEAREST WELL		5
9		TARGETS SCORE	LINES 6 + 7 + 8	27.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	0
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		0
13B		DISTANCE TO SW		10
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	0
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	0
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.000
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		0
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 - 22	17
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	0
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		10
26B		DISTANCE TO POPULATION		10
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	100
27		LIKELIHOOD SCORE	LINES 25 + 26C	100
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.000
29	AIR - TARGETS	POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		5
31		WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 - 33	35
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	0
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		0
37A		ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		10
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	200
38		LIKELIHOOD SCORE	LINES 36 + 37C	200
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.000
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		1
41		NEAREST RESIDENCE		5
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 - 42	6
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	0
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			0.00

SITE NAME: SHERMAN NO. 2 (NE)
PA NUMBER: 07-140

SITE SAFETY

LINE NO.				
1	THREAT	ACCESSIBILITY		20
2	HAZARDS	OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	50
4		UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 - 7	50
9	TARGETS	POPULATION - 1 MILE		1
10		NEAREST RESIDENCE		5
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 - 11	6
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**6.00**

07-140, #23: Adit 20' east of opening

07-140, #22: Adit 60' east from Carpenter Creek

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: SHERMAN NO. 2 (Southwest) PA#: 07-142

Date: May 26, 1993 Time: 1700

Field Team Leader: Tuesday, Pioneer

Sampling Personnel: Belanger, Clark, Lasher;
Pioneer
Pierson; TD&H

Visitors: Earl McCurley, MDSL

Weather/Seasonality Observations: Partly cloudy; Occasional rain; Approx. 40°F; cool, wet spring.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #24: Loadout structure; #25: Waste rock dump adjacent to Burg Creek; #26: Waste rock from top; #27: Adit opening; #28: Adit proximity to creek; #29: Tailings in Carpenter Creek from upstream.
Video Tape No. 1

General Comments/Observations (not covered specifically in attached Inventory Forms): Possible hazardous structure (loadout structure); open caving adit (HMO); and a small dump (two XRF samples were taken). Tailings in Carpenter Creek floodplain are from Silver Dyke Tailings pond, blowout 1/4 mile upstream; one XRF sample of floodplain tailings.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Close adit. Move dump out of or away from Burg Creek.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): SHERMAN NO. 2 PA#: 07-142

Legal Description: T 14N ;R 8E ;Sec. 15 ,NW 1/4SW 1/4 ___1/4

County: CASCADE Mining District: NEIHART

Latitude: N 46° 58' 23" Longitude: W 110° 41' 56"

Primary Drainage Basin and Code: Belt Creek/10030105
Secondary Drainage Basin: Burg Creek/Carpenter Creek

USGS Quadrangle map name(s): Neihart

Mine Type/Commodities: Hardrock/Silver, Lead, Zinc, Copper

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Private/Public
Owner, Agent, or Contact(Include address and phone when available): Peter Antonioli, Alexander Resources Co., P.O. Box 791, Butte, MT 59702. (406) 723-8730; Lewis and Clark National Forest.

Relationship to other mines/sites in the area/district: Near the Savage Mill and/or Minute Man mine. Associated with PA# 07-140 Adit.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 6300', Slope 30°,
Aspect West

Land use: Mining X , Recreational X , Residential___, Urban___,
Agricultural___, Other(Specify)

Area of disturbed/unvegetated lands? 0.14 acres.
Dimensions: 60 feet x 100 feet

Predominant vegetation types: Lodgepole pine, willow, kinniKinnick, shrubs

Access: roads - good___,poor X ,4wd___,trail X .
Other logistical considerations (proximity to other sites). Hike from the north bank of Carpenter Creek.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are no well logs listed in MBMG well log database within a 1 mile radius. However, there is a well at a residence located 0.5 mile north.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies on the east side of perennial Burg Creek, just before its confluence with the perennial Carpenter Creek. Burg Creek flows northwest past the site approx. 500 feet to confluence with Carpenter Creek, which flows southwest away from the site. The site is reported to be underlain by Snow Creek porphyry and a gray gneiss.

Mining/milling history, ore type/tenor, host rock, gangue: The claim was located in the 1880's and operated intermittently since that time. In 1949, it was reported that the adit and shaft were caved. Ore mined contained as much as 46% lead, 36 to 40 ounces of silver a ton. Galena, sphalerite, pyrite, chalcopyrite, and silver sulfides are the principle sulfide minerals. Some cerussite is also present. Gangue minerals are calcite, limonite, ankerite, and quartz. Deposit was a fissure filling in Snow Creek porphyry and gray gneiss.

Mine Operation?

Shafts - Yes___, No X, # ___, Comment None found

Adits - Yes X, No___, # 1, Comment Seepage

Pits - Yes___, No X, # ___, Comment___

Placers - Yes___, No X, # ___, Comment___

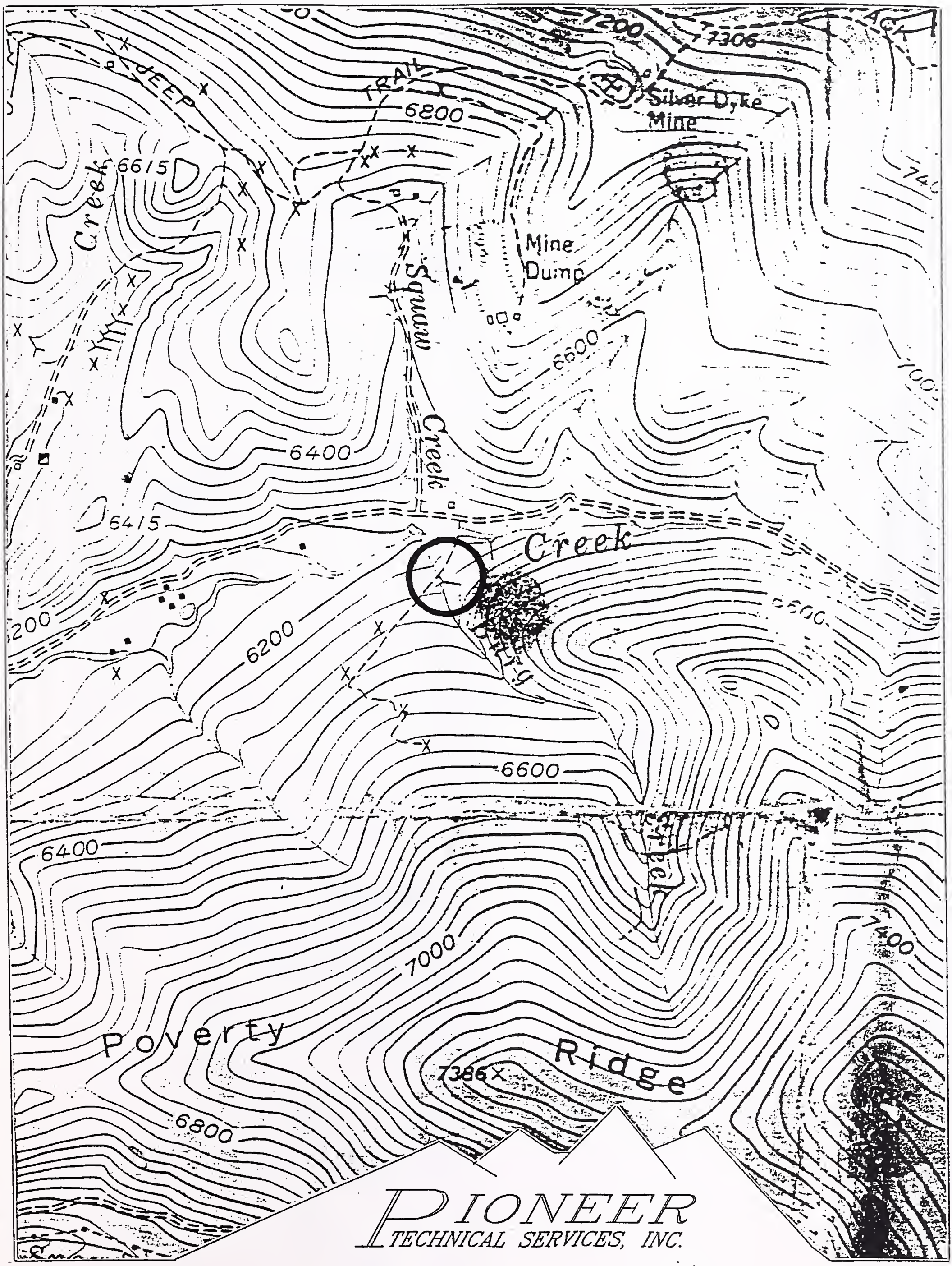
Other - Yes___, No X, # ___, Comment___

Mill Operation? Yes___, No X. If yes answer the next three questions:

Period(s) of Operation: Not at this site. Mill foundation (Savage Mill) located across Carpenter Creek at junction of road.

Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN^- leach (vat, heap), floatation, smelting?
N/A

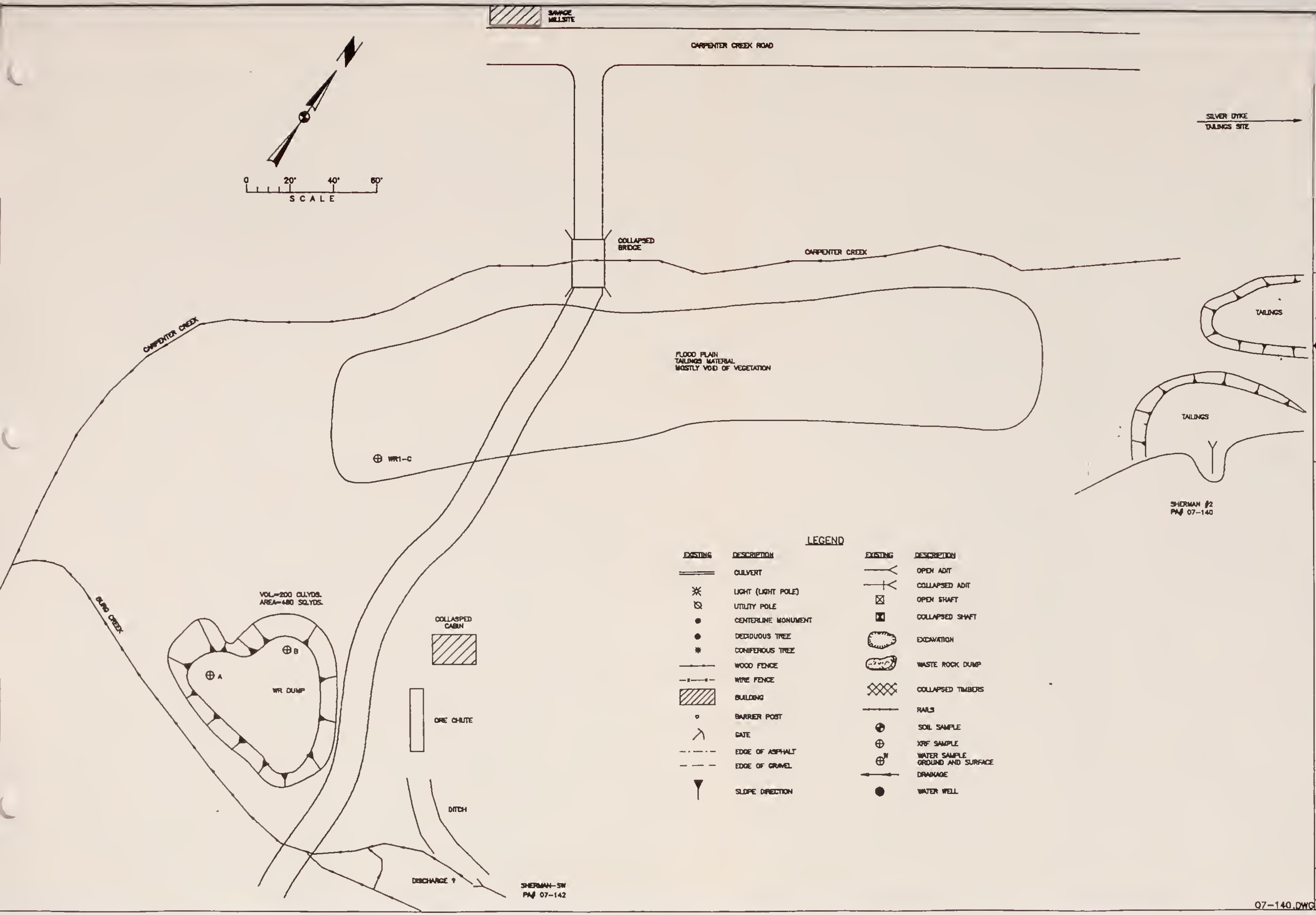


PIONEER TECHNICAL SERVICES, INC.

SHERMAN #2, P.A. NO. 07-142

T14N, R08E, SECTION 15

SCALE: 1" = 1000'



07-140.DWG

DRAWN JTP DATE 15 JULY 93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

PIONEER TECHNICAL SERVICES, INC. BUTTE, MT.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS-BOZEMAN-KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

SHERMAN #2 PA# 07-140 & 07-142
NEIHART DISTRICT CASCADE COUNTY

SHEETS

SHEET NO.

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution(approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable(based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment(Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Tuesday, Belanger

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	200	West lobe of small dump	None	6.8 (D)	0.04	N/A	N/A	XRF Analysis
WR-1B	WR		East lobe of small dump	None	6.2 (D)	0.045	N/A	N/A	XRF Analysis
WR-1C	TAIL		Tailings in floodplain	None	6.0 (D)	0.04	N/A	N/A	XRF Analysis
WR-2	TAIL	N/A	Material from Savage Mill across Carpenter Creek from site	None	NM	NM	N/A	N/A	XRF Analysis

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: Tailings in floodplain are from Silver Dyke Tailings upstream from site. NM = Not Measured

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes ?, No ___, Number: 1 Identification: Adit #1 has a possible trickle that may be from adjacent Burg Creek.

Filled shafts: Yes ___, No X, Number: ___ Identification: ___

Seeps/Springs: Yes ___, No X, Number: ___ Identification: ___

Groundwater wells within 4 miles?: Yes X, No ___;
Number of well logs: 21

Distance to nearest well used for drinking? Approx. 0.5 mile

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite ___, Probable ___, Possible X, Unlikely ___.
Uncontained source in floodplain with abundant surface water.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X, No ___, Name(s): Burg Creek is adjacent to the site; Carpenter Creek is 100 feet away.

Dry streambeds: Yes ___, No X, Name(s): ___

Other surface water: Yes X, No ___, Name(s)/Description: Negligible adit discharge

Waste materials within any floodplain: Yes X, No ___ Source ID(s): Tailings in Carpenter Creek floodplain from upstream; toe of dump in Burg Creek floodplain

Approximate Flood frequency? ___ 1 yr, X 10 yr, ___ 100 yr

Estimated seasonal flow of stream(s) (cfs)? Burg Creek is estimated at 0.3 cfs in May, possibly dry in summer.
High Flow: 10 cfs, Average Flow: 0.1 cfs

Distance between waste source(s) and nearest surface water body (ft)? 2 feet

Surface water draining onto or through waste sources: Yes ___, No X,
Describe: ___

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?) Wetland; Belt Creek has limited fishery, irrigation, agriculture and wetland.

Observed erosional/sedimentation/stream turbidity problems? Yes ___, No X, Distance downstream (ft)? ___ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): ___

SURFACE WATER INVENTORY FORM

SAMPLERS: Tuesday, Belanger

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm at 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	AD	Adit discharge	7.1	110	NM	NM	NM	< 1 gpm (E)	N/A	N/A	Field Parameters
SW-2	SW	Burg Creek upstream from adit	7.5	70	NM	NM	NM	0.3 cfs (E)	N/A	N/A	Field Parameters
SW-3	SW	Burg Creek below confluence with adit	7.26	70	NM	NM	NM	0.3 cfs (E)	N/A	N/A	Field Parameters
SW-4	SW	Burg Creek below dump	7.26	70	NM	NM	NM	0.3 cfs (E)	N/A	N/A	Field Parameters

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? None

Wetlands present: Yes X , No ___, Describe: Carpenter Creek floodplain

Carbonate rocks/soils: Yes ___, No X , Describe: ___

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X ; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments ___

Nearest residence(ft or miles)? 0.5 mile

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Tuesday, Belanger

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH /MODERATE/LOW/NONE)
WR-1	S2-; FEOX (minor)	Dry	4,320	4,320	Yes	Low
Adit #1	FEOX	N/A	N/A	N/A	N/A	N/A

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_, Describe:________

Population within 1 mile: 1-10_X_; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments________

Evidence of recreational use on site: Yes_X_, No___, Describe: Small campfire ring 50 feet from the site.

Accessibility - Fences, warning signs, closed roads? Easily accessible by walking 200 feet from Carpenter Creek Road.

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment________
Wilderness Area - Yes___, No_X_, Comment________
T&E Species Habitat - Yes___, No_X_, Comment________
Bat Habitat - Yes_X_, No___, Comment Possible

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High___, Medium_X_, Low___
Wetlands Frontage - High___, Medium___, Low_X_
Fisheries Habitat and Species Classification - 6
Sport Fishery Classification - 6

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_1_, types and locations: Adit

Hazardous structures: Yes_X_, No___, Number_1_, types and locations: Loadout structure

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____, types and locations:________

Unstable waste piles, impoundments, undercut banks: Yes____, No_X_, Number____, types and locations:________

Fire and/or Explosion hazards: Yes___, No_X_, Explain:________

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Sherman No. 2, Prepared by Chen-Northern, October 16, 1989.

USBM, Mines and Mineral Deposits (Except Fuels), Cascade County, Montana, Information Circular No. 7589, Written by Almon F. Robertson, April 1950, p. 58.

USGS, Topographic Map, Neihart, Montana, 7 1/2 minute Quadrangle, 1961.

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

SHERMAN #2 (SOUTHWEST)
PA NO. 07-142

AIMSS SCORESHEET

SITE NAME: SHERMAN NO. 2 (SW)
PA NUMBER: 07-142

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.795
6	GW - TARGETS	WELLS - 1 MI. x 2.5		2.5
7		WELLS - 1 TO 4 MI		20
8		NEAREST WELL		5
9		TARGETS SCORE	LINES 6 + 7 + 8	27.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	8745
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	400
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.880
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		0
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 - 22	17
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	5984
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		10
26B		DISTANCE TO POPULATION		10
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	100
27		LIKELIHOOD SCORE	LINES 25 + 26C	100
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.088
29	AIR - TARGETS	POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		5
31		WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 - 33	35
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	308
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		50
37A		ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		10
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	200
38		LIKELIHOOD SCORE	LINES 36 + 37C	250
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.000
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		1
41		NEAREST RESIDENCE		5
42		RECREATIONAL USE		2
43		TARGETS SCORE	SUM LINES 40 - 42	8
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	0
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**0.15**

SITE NAME: SHERMAN NO. 2 (SW)
PA NUMBER: 07-142

SITE SAFETY

LINE NO.				
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	50
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	40
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 - 7	90
9		POPULATION - 1 MILE		1
10	TARGETS	NEAREST RESIDENCE		5
11		RECREATIONAL USE		2
12		TARGETS SCORE	SUM LINES 9 - 11	8
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**14.40**

XRF ANALYSIS RESULTS

SHERMAN NO. 2 (SOUTHWEST)
PA NO. 07-142

MDSL AMRB/PIONEER 4/9/93

Mine Name: Sherman #2 PA# 07-142 and 07-140

XRF Field Analyses

Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
07-140-WR-A		14564.4	14774.9	529.935	332.429 *	2945.77	25854.1			3862.04		166.953
07-140-WR-B		14216.4	3059.75	193.214 *	379.385 *	5792.19	66590.2		291.205 *	4760.11		117.771
07-140-WR-C		21008.2	3082.48	2093.45		1958.92	31090.2		2366.39	650.198		140.397
07-142-WR-A		14564.4	14774.9	529.935	332.429 *	2945.77	25854.1			3862.04		166.953
07-142-WR-B		14216.4	3059.75	193.214 *	379.385 *	5792.19	66590.2		291.205 *	4760.11		117.771
07-142-WR-C		21008.2	3082.48	2093.45		1958.92	31090.2		2366.39	650.198		140.397

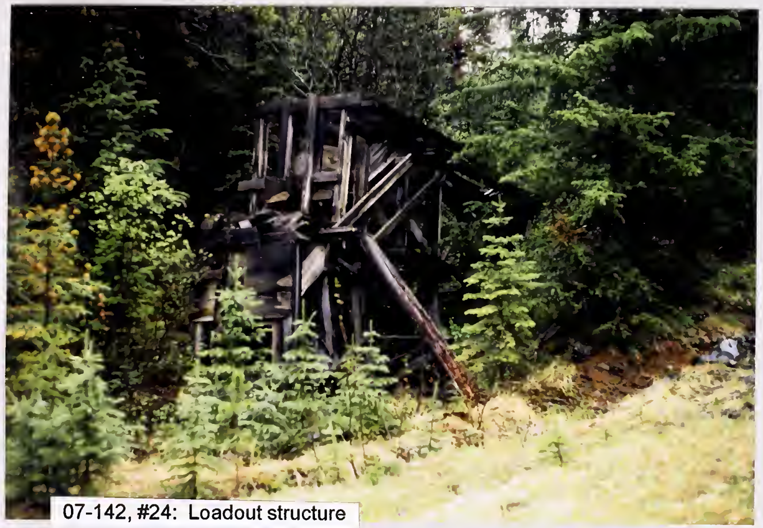
	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
07-140-WR-A	72.9955		7.30429 *	229.513	231.966			315.037			
07-140-WR-B	32.7387 *		38.1923	8605.01	155.594			2772.71	80.8152 *		
07-140-WR-C	189.605		18.0838 *	5243.2	190.194			1519.83	107.266 *		32.37 *
07-142-WR-2	202.381		48.3763	27628.5	222.812			1611.17	478.085		93.2002 *
07-142-WR-A	72.9955		7.30429 *	229.513	231.966			315.037			
07-142-WR-B	32.7387 *		38.1923	8605.01	155.594			2772.71	80.8152 *		
07-142-WR-C	189.605		18.0838 *	5243.2	190.194			1519.83	107.266 *		32.37 *

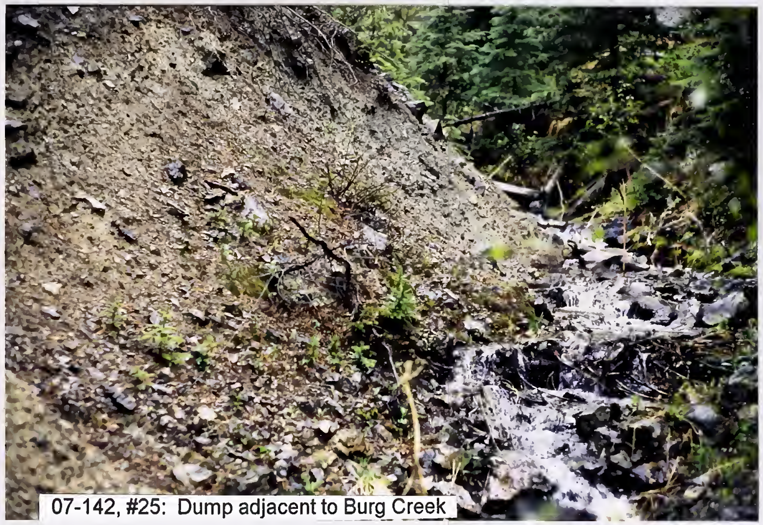
	As (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Mn (mg/Kg)	Pb (mg/Kg)	Zn (mg/Kg)
7-135-SS-1	10.5	26.1	20600	607	667	548

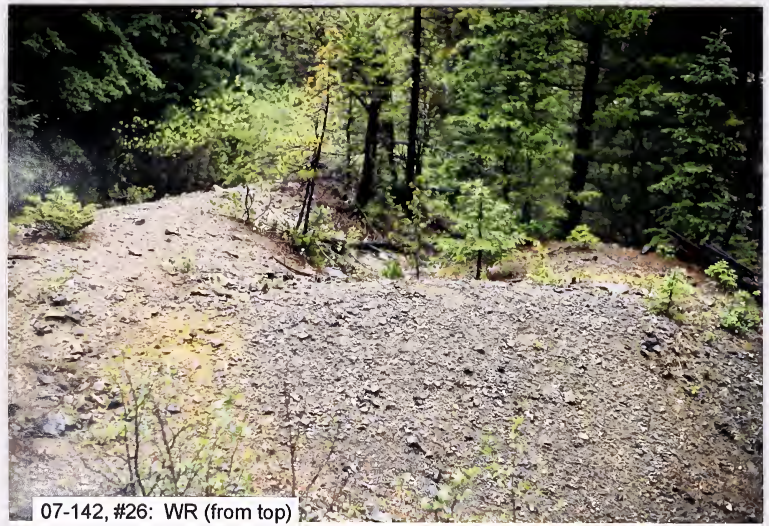
LEGEND

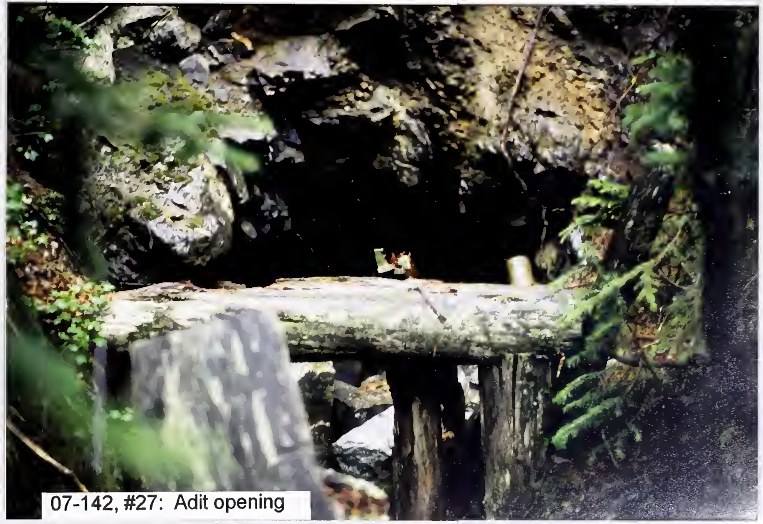
WR-A&B - Dump on-site.
WR-C - Floodplain tailings.
WR-2 - Savage Mill and tailings.

* - Estimated Quantity
$ - Unvalidated Data

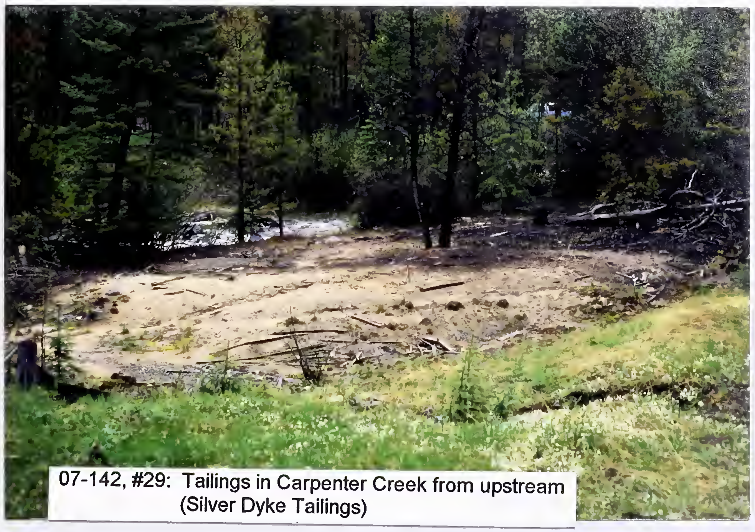

07-142, #24: Loadout structure


07-142, #25: Dump adjacent to Burg Creek


07-142, #26: WR (from top)


07-142, #27: Adit opening

07-142, #28: Adit proximity to creek


07-142, #29: Tailings in Carpenter Creek from upstream
(Silver Dyke Tailings)

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: BIG SEVEN MINE **PA#:** 07-156

Date: May 27, 1993 **Time:** 1015

Field Team Leader: Tuesday, Pioneer

Sampling Personnel: Flammang, Lasher, Clark,
Belanger; Pioneer
Pierson; TD&H

Visitors: Earl McCurley, MDSL
Rick Burger, MDSL

Weather/Seasonality Observations: Overcast; cool (55°F); spring runoff is occurring; some snow present in shady locations.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #9: Mill building and yellow WR-2; #11: Discharge from adit and WR-1 in background; #30: SW-1 and SE-1 sample location. Video Tape No. 1

General Comments/Observations (not covered specifically in attached Inventory Forms): N/A

Other Hazardous Materials/Substances Present: Two empty 300 gallon above ground fuel tanks behind garage, probably contain sludge; Assorted unknown laboratory chemicals and 50 bottles in assay lab adjoining garage, also some big bags of white powder; Several old transformers by above ground tanks, PCBs, they look in good shape; Two transformers near Adit #1 entrance on ground, one in creek, neither appear to have leaked; Two bottles of non-detergent motor oil in metal shed, one 5 gal. bucket of lubricant partially full; In mill building, one 30 gal. drum each of amy/xanthate and potassium (used for floatation?). One full 55 gal. drum of unknown contents, barrel is closed and in good shape; Bags of lime.

General Comments on Potential Remedial Alternatives: Consolidate and revegetate tailings; smooth waste rock dumps and remove from surface water drainages; treat adit discharge prior to discharge. Entire drainage is impacted, but surface water drains through large wetland prior to leaving watershed into Snow Creek.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): BIG SEVEN MINE PA#: 07-156

Legal Description: T 14N ;R 8E ;Sec. 28 , SE1/4 NE1/4 ___1/4

County: CASCADE Mining District: NEIHART

Latitude: N 46° 56' 55" Longitude: W 110° 42' 15"

Primary Drainage Basin and Code: Belt Creek/10030105
Secondary Drainage Basin: Snow Creek

USGS Quadrangle map name(s): Neihart

Mine Type/Commodities: Hardrock/Gold, Silver, Lead, Zinc

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Private/Public
Owner, Agent, or Contact(Include address and phone when available): Paul Hatfield, Lexington Silver Lead Mines, Inc., P.O. Box 323, Veradale, WA 99037. (800) 637-3773; Lewis and Clark National Forest.

Relationship to other mines/sites in the area/district: Near Cornucopia, Lexington, Benton, Black Diamond and Commonwealth mines; just over ridge to the west are Silver Belt and Fairplay mines.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 7100' , Slope 20°-25°, waste rock area; 15°-20°, tailings area, Aspect North

Land use: Mining___, Recreational X , Residential___, Urban___, Agricultural___, Other(Specify)

Area of disturbed/unvegetated lands? 11.5 acres.
Dimensions: 2,500 feet x 200 feet

Predominant vegetation types: Lodgepole forest on land surrounding mine; willow/riparian in drainage bottom below tailings.

Access: roads - good X ,poor___,4wd___,trail___.
Other logistical considerations (proximity to other sites).
Locked gate near crossing of Snow Creek.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 3 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Mine lies on the headwaters of an unnamed tributary (intermittent) which flows north into the perennial Snow Creek. Snow Creek flows west into Carpenter Creek (perennial) about 1 mile below the mine. Vein cuts through pinto diorite, gneiss, Snow Creek porphyry, and Neihart quartzite.

Mining/milling history, ore type/tenor, host rock, gangue: In 1943, a 100-ton bulk flotation mill was remodeled to a 150-ton selective flotation mill. Tenor: 100 to 500 oz. silver and $20 to $50 in gold per ton. Ore is highly silicious; carbonates are rare except in the lower part of the mine where ankerite becomes locally abundant. Ore minerals are pyrite, galena, sphalerite, proustite, pearcite, and polybaslite.

Mine Operation?
Shafts - Yes___, No X, # ___, Comment
Adits - Yes X, No___, # 3, Comment Deep; partially caved
Pits - Yes X, No___, # 1, Comment Northeast of building
Placers - Yes___, No X, # ___, Comment
Other - Yes___, No X, # ___, Comment

Mill Operation? Yes X, No___. If yes answer the next three questions:

Period(s) of Operation: Unknown

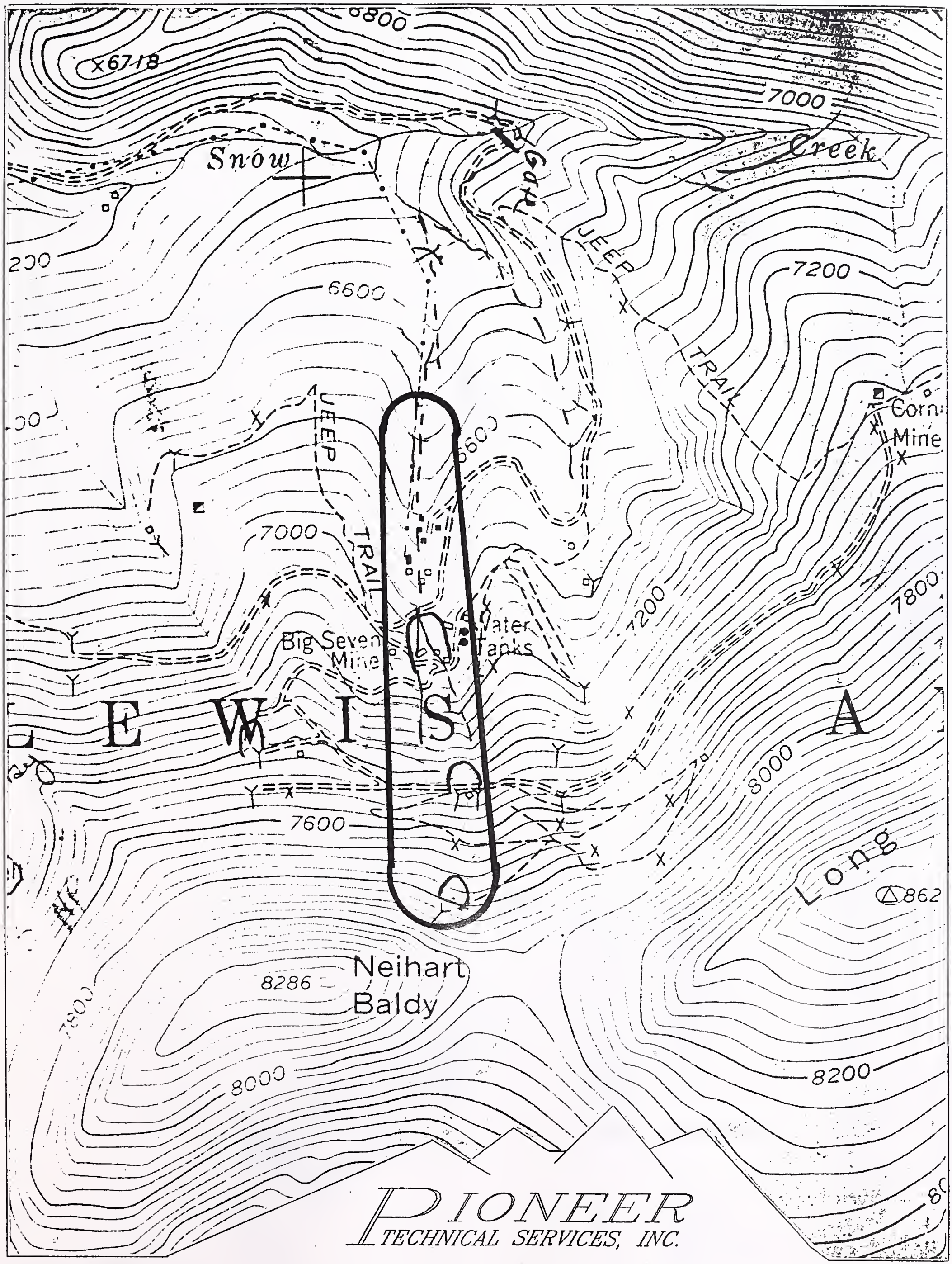
Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: Big Seven

Process? Hg-amalgam, CN^- leach (vat, heap), floatation, smelting? Floatation for at least one operating period.

Montana Bureau of Mines and Geology
Water Well Log Data

10/22/1993

Well No.	Location	Depth	Yield	Static Water Level
M:123062	14N 08E 20 DBA	41.0	4.0	24.00
M:123061	14N 08E 20 DBA	40.0	7.0	0.00
M:25649	14N 08E 32 BDC	120.0	8.0	7.00

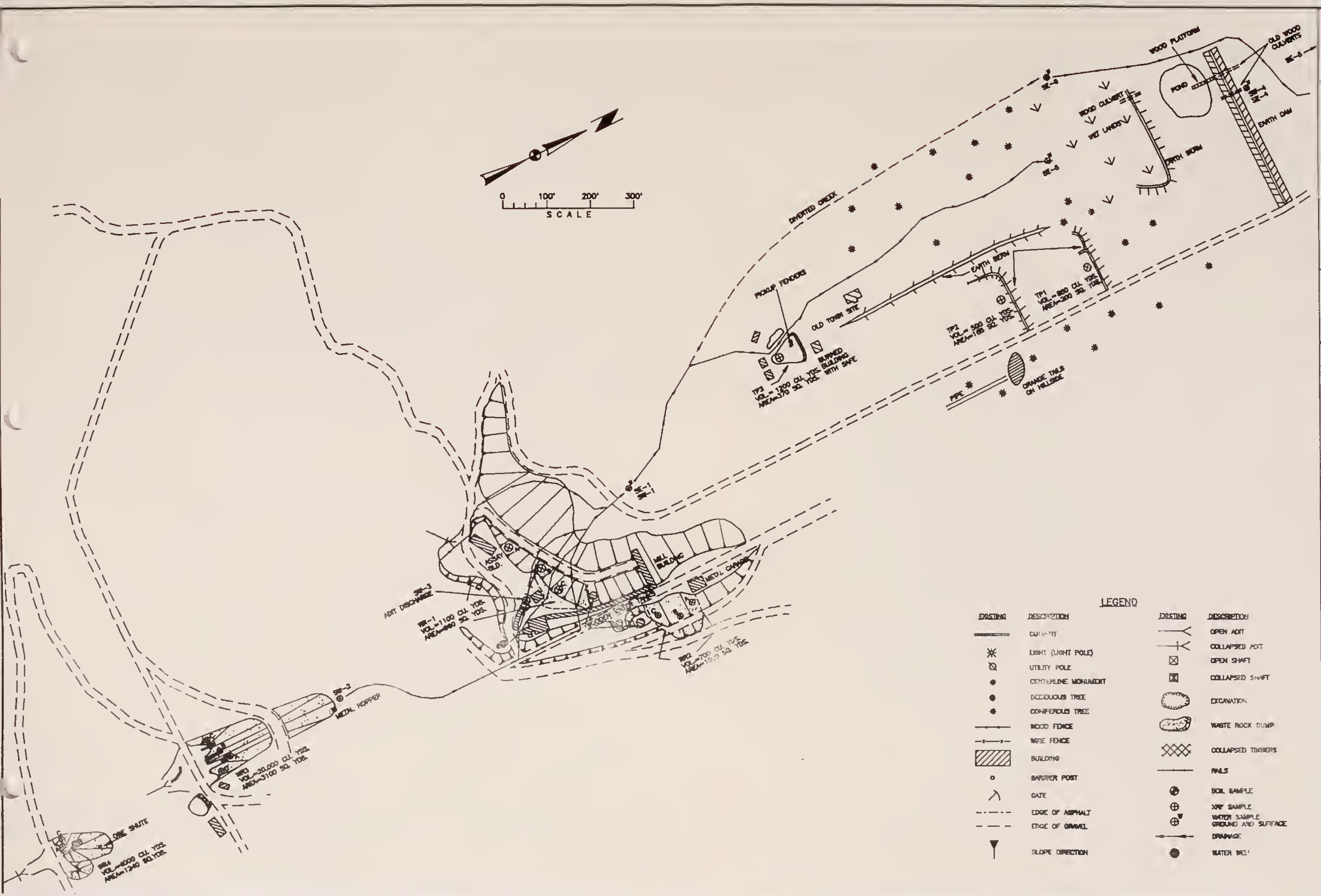


PIONEER
TECHNICAL SERVICES, INC.

BIG SEVEN, P.A. NO. 07-156

T14N, R08E, SECTION 28

SCALE: 1" = 1000'



DRAWN MWC DATE 8/93
DESIGNED TPR JOB NO. 93-17
APPROVED WJB F.B. NO.

PIONEER

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS-BOZEMAN-KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

BIG SEVEN MINE PA# 07-156
NEIHART DISTRICT CASCADE COUNTY

SHEET NO.

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): 80% sand, 10% silt, 10% clay

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): Tailings pond under town is approx. 10 feet deep; other two were narrow piles, 9 feet and 6 feet deep.

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): Tailings pond 3 (under town) is wet; tailings piles 1 and 2 are dry.

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): Pushed up dirt at end of TP-3; in good condition and vegetation except where stream cuts across it.

Comments on potential for mitigation: Move stream off of tailings into already constructed channel.

SOURCE INVENTORY FORM

SAMPLERS: Tuesday, Clark, Pierson, Belanger

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	1,100	Dump at building area; W side	None	4.23 (S)	0.04	07-156-WR-1	05/27/93 1230	T-Metals, ABA
WR-1B	WR		Dump at building area; center	None	NC	0.05			
WR-1C	WR		Dump at building area; E side	None	NC	0.05			
WR-2A	WR	700	Dump above mill; N side	None	3.23 (S)	0.05	07-156-WR-2	05/27/93 1330	T-Metals, ABA
WR-2B	WR		Dump above mill; center	None	NC	0.05			
WR-2C	WR		Dump above mill; S side	None	NC	0.06			
WR-3A	WR	20,000	N end of WR-3, off knob	None	NC	0.05	07-156-WR-3	05/27/93 1400	T-Metals, ABA
WR-3B	WR		W of main knob (WR-3A), off knob in gray area	None	NC	0.04			
WR-3C	WR		W side of WR-3 in yellow area	None	NC	0.04			
WR-4A	WR	4,000	W of large knob near top of WR-4 in yellow material	None	NC	0.06	07-156-WR-1	05/27/93 1330	T-Metals, ABA
WR-4B	WR		Large knob on W side near top	None	NC	0.08			
WR-4C	WR		On W side of WR-4 in brown material	None	NC	0.05			
TP-1A	TAIL	880	N of TP-2; 0-5', tan sand	Breached dam	NC	NC	N/A	N/A	XRF Analysis
TP-1B	TAIL		N of TP-2; 5-7', tan clay	Breached dam	NC	NC	N/A	N/C	XRF Analysis
TP-1C	TAIL		N of TP-2; 7-9', gray clay and sand	Breached dam	NC	NC	N/A	N/A	XRF Analysis
TP-2	TAIL	500	N of TP-3	Breached dam	6.28 (S)	NC	07-156-TP-2	05/27/93	T-Metals, ABA
TP-3A	TAIL	1,200	Pile below townsite; center, E side; 0-3', orange/red sand	Dam	6.44 (S)	NC	07-156-TP-3A	05/27/93 1645	T-Metals, ABA
TP-3B	TAIL		Pile below townsite; center, E side; 3'-10', gray sand/silt	Dam	6.45 (S)	NC	07-146-TP-3B	05/27/93 1645	T-Metals, ABA
CONC	OTH	N/A	Material present in bins in mill building	In bin	N/A	N/A	N/A	N/A	N/A
SL-1	BKGRND	N/A	Background soil	N/A	4.74 (S)	NC	07-156-SL-1	05/27/93 1530	T-Metals, ABA

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 07-156-WR-1 is composite of WR-1A through -1C. 07-156-WR-2 is composite of WR-2A through -2C. 07-156-WR-3 is composite of WR-3A through -3C. 07-156-WR-4 is composite of WR-4A through -4C. NC = Not Collected.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes X, No ___, Number: 1 Identification: Adit #1

Filled shafts: Yes ___, No X, Number: ___ Identification: ___

Seeps/Springs: Yes X, No ___, Number: 3 Identification: South hillside; headwaters of water shed.

Groundwater wells within 4 miles?: Yes X, No ___;
Number of well logs: 13

Distance to nearest well used for drinking? Approx. 1 1/4 mile upgradient.

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite ___, Probable X, Possible ___, Unlikely ___.
Water is flowing over and through waste rock and tailings pile. Water is also flowing out of Adit #1 and is staining everything red for approx. 1000' downstream.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: Flammang, Belanger, Clark

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-3	AD	Adit #1 discharge	0.06 cfs (M)	6.63	500	NC	5.1	25	N/A	07-156-SW-3	05/27/93 1530	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3

*FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): NC = Not Collected.

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X , No ___, Name(s): Unnamed tributary of Snow Creek; most of the creek has been channelized to the west side of the site just below the townsite, some water still flows over tailings.

Dry streambeds: Yes ____, No X , Name(s): ____

Other surface water: Yes X , No ___, Name(s)/Description: One small pond on SW corner of final dam structure, drains through two wood culverts into a 1+ acre wetland area.

Waste materials within any floodplain: Yes X , No ___ Source ID(s): TP-1, -2, and -3

Approximate Flood frequency? X 1 yr, ___10 yr, ___100 yr

Estimated seasonal flow of stream(s) (cfs)? 1.45 cfs at stream junction below mine; before it crosses the tailings
High Flow: 2 cfs, storm , Average Flow: 0.5 cfs, dry

Distance between waste source(s) and nearest surface water body (ft)? WR-1, 0' (water flows over west end); WR-2, 100'; WR-3, 10' east; WR-4 none; TP-1, -2, water flows about 10' from west side of pile; TP-3, water flows over tailings.

Surface water draining onto or through waste sources: Yes X , No ____,
Describe: Surface water runs over WR-1 and TP-3.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Belt Creek has fishery, recreation, agricultural, and possibly residential.

Observed erosional/sedimentation/stream turbidity problems? Yes X , No ___, Distance downstream (ft)? 2500 Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): Discoloration of rocks and sediment in stream 500 feet from discharge; tailings in streambank and bed for 2,000 feet downstream from first tailings impoundment; erosional gullies in WR-1 and TP-3.

SURFACE WATER INVENTORY FORM

SAMPLERS: Flammang, Belanger, Clark

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm at 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	Above tailings	5.86	280	NM	NM	67	1.45 cfs (M)	07-156-SW-1	05/27/93 1415	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-1	SE	At junction of two streams below mine	6.97	N/A	N/A	N/A	N/A	N/A	07-156-SE-1	05/27/93 1415	T-Metals, ABA
SW-2	SW	Below WR-3	5.01	1000	NM	11.2	8	< 0.1 cfs (M)	07-156-SW-2	05/27/93 1430	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SW-4	SW	Below final impoundment from wood culvert	4.09	520	NM	9.4	2	0.106 cfs (M)	07-156-SW-4	05/27/93 1630	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-4	SE	Below final impoundment from wood culvert	5.77	N/A	N/A	N/A	N/A	N/A	07-156-SE-4	05/27/93 1630	T-Metals, ABA
SW-5	Blank	QA/QC blank	N/A	N/A	N/A	N/A	N/A	N/A	07-156-SW-5	05/27/93 1700	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-5	SE	Below site before confluence with Snow Creek	4.9	N/A	N/A	N/A	N/A	2 cfs (E)	07-156-SE-5	06/01/93 1815	T-Metals
SE-6	SE	In channelized stream just above final dam	Water 6.08 Soil 6.6	230	N/A	N/A	N/A	N/A	N/A	N/A	XRF Analysis

*FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): NM = Not Measured

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides? (SO_3)

Presence of evaporative salt deposits? (ESD)

Discolored or turbid seepage? (SPG)

Presence of long filamentous algae in drainages, mosses in moist areas?

Presence of ferric hydroxide precipitates? (FEOX)

Presence of burned or stressed vegetation? (VEG)

pH ≤ 5.0 (pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? Approx. 2 to 3 acres where tailings and townsite are located.

Wetlands present: Yes X , No ___, Describe: 2+ acres of wetlands present below final tailing pile.

Carbonate rocks/soils: Yes ___, No X , Describe:

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X ; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 1.5 miles

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Tuesday, Pierson, Clark

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/ MODERATE/LOW/NONE)
WR-1	FeOx; pH	Dry	8,640	8,640	Yes	High
WR-2	pH	Dry	8,640	9,000	Yes	High
WR-3	FEOX; pH	Dry	27,900	27,900	Yes	High
WR-4	FEOX; pH	Dry	11,160	11,160	Yes	High
TP-1	None	Dry	1,800	900	Yes	High
TP-2	None	Dry	1,485	1,040	Yes	High
TP-3	FEOX	Partial	3,330	2,330	Yes	Moderate
Adit #1	FEOX	Wet	N/A	N/A	N/A	N/A

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_, Describe:______

Population within 1 mile: 1-10___; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments None

Evidence of recreational use on site: Yes___, No_X_, Describe:______

Accessibility - Fences, warning signs, closed roads? Locked gate about 1 mile down

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment______
Wilderness Area - Yes___, No_X_, Comment______
T&E Species Habitat - Yes___, No_X_, Comment______
Bat Habitat - Yes___, No_X_, Comment______

Primary Drainage_X_; Secondary Drainage___; No Information___:

Riparian Habitat Quality - High_X_, Medium___, Low___
Wetlands Frontage - High___, Medium_X_, Low___
Fisheries Habitat and Species Classification - 3
Sport Fishery Classification - 3

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number 2, types and locations: Adit #1 (WR-1) and Adit #2 (WR-3)

Hazardous structures: Yes___, No_X_, Number 5, types and locations: All look to be in good shape, more buildings at townsite.

Unstable highwalls, pits, trenches, slopes: Yes_X_, No___, Number 1, types and locations: Pit just northeast of mill building.

Unstable waste piles, impoundments, undercut banks: Yes_X_, No____, Number 4, types and locations: All waste rock piles are steep, unvegetated, and at angle of repose.

Fire and/or Explosion hazards: Yes___, No_X_, Explain:______

Bibliography

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LABORATORY ANALYTICAL DATA

BIG SEVEN MINE
PA NO. 07-156

Big Seven PA# 07–156
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – TUESDAY
INVESTIGATION DATE: 05/27/93
Page 1 of 2.

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
07–156–SE–1	242	161	11.1	19.4	13.4	73.2	37800	0.016 U	2870	36.8	518	14.1 J	2900	NR
07–156–SE–4	10.7	175	0.4 U	20.6	138	48	38400	0.016 U	863	67.4	111	5.12 J	312	NR
07–156–SE–5	124	715 J	22.3 J	42.1 J	31.7 J	98.9	39000	0.129	18300	147	887	5.94 UJ	4150	NR
07–156–TP–2	212	365 J	13.5 JX	7.32 J	13.3	55.7	27100	0.071	4140 J	36 J	2510 J	3.03 UJ	2740 J	NR
07–156–TP–3A	121	174	9.5	3.27	18.1	47.2	17900	0.016 U	2710	20.4	434	9.51 J	2430	NR
07–156–TP–3B	126	139	9.7	7.48	30.3	52.1	29700	0.016 U	6860	47.6	576	15.2 J	2530	1.279 U
07–156–WR–1	381	97.2	2.0	14.8	22.8	56.8	55100	0.014 U	1280	17.2	506	5.29 J	785	NR
07–156–WR–2	288	118	1.0	1.4	11	76	33000	0.014 U	146	3.67	2880	9.94 J	631	NR
07–156–WR–3	246	164	0.5 U	1.71	17.6	39.2	32700	0.015 U	71.2	5.1	956	7.02 J	368	NR
07–156–WR–4	265	62.3	10.2	1.22 U	8.97	53.8	30900	0.014 U	47.8	4.96	1220	11.2 J	2200	NR
BACKGROUND	15.1	166	0.6 U	6.73	25.1	28.3	26600	0.020 U	422	16.5	420	4.33 UJ	336	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
07–156–SL1	0.03	0.94	–0.33	–1.27	0.02	<0.01	0.01	0.00	–0.33
07–156–TP3A	0.48	15.0	12.9	–2.11	0.05	0.25	0.18	7.81	5.08
07–156–TP3B	0.74	23.1	21.4	–1.14	0.02	0.44	0.28	13.7	8.19
07–156–TP–2	1.19	35.9	37.3	1.38	0.18	0.46	0.51	14.4	22.9
07–156–WR1	2.05	64	–3.97	–68	1.98	0.01	0.06	0.31	–4.28
07–156–WR2	1.56	48.7	–2.06	–50.8	1.51	<0.01	0.05	0.00	–2.06
07–156–WRD3	0.83	25.9	–3.37	–29.3	0.8	<0.01	0.03	0.00	–3.37
07–156–WR–4	0.46	14.4	0.33	–14.0	0.45	<0.01	0.01	0.00	0.33
07–156–TP3BDUP	0.76	23.7	21.4	–2.31	0.02	0.45	0.29	14.1	7.37

Big Seven PA# 07−156
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER − TUESDAY
INVESTIGATION DATE: 05/27/93
Page 2 of 2.

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
07−156−SW−1	1.5 J	8.73	5	6.47	5.7 J	9.17	643	0.3 J	2790 J	38.7	6.17 J	18.3 U	1910 J	82.1
07−156−SW−2	2.38 J	18.3	10.2	5.99 U	5 U	12.2	20.1	0.18 J	590 J	13.6	2.25 J	18.3 U	1230 J	25.3
07−156−SW−3	2.84 J	11.1	13.9	45	5 U	34.8	11400	0.13 J	14500 J	169	8.16 J	18.3 U	6810 J	161
07−156−SW−4	1.55 J	24.7	8.17	5.99 U	5 U	10.5	238	0.21 J	2080 J	83.8	3.33 J	18.3 U	4990 J	243
07−156−SW−5	1.49 U	2.24 U	2.55 U	5.99 U	5.17 J	3.67	13.5 U	0.1 J	4.4 J	8.78 U	1 U	18.3 U	6 U	8.8

U − Not Detected; J − Estimated Quantity; X − Outlier for Accuracy or Precision; NR − Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2−N	CYANIDE
07−156−SW1	135	< 5.0	84	0.11	NR
07−156−SW2	69	< 5.0	37	< 0.05	NR
07−156−SW3	328	< 5.0	213	< 0.05	NR
07−156−SW4	377	< 5.0	240	0.12	NR
07−156−SW5	18	< 5.0	< 5.0	< 0.05	NR

LEGEND

SE1 − At junction of two streams below mine.
SE4 − Below final impoundment from wood culvert.
SE5 − Below site but before confluence with Snow Creek.
TP2 − Sample of the TP2 subsample.
TP3A − Sample of the TP3A subsample.
TP3B − Sample of the TP3B subsample.
WR1 − Composite of subsamples WR1A, 1B, and 1C.
WR2 − Composite of WR2A, 2B, and 2C.
WR3 − Composite of subsamples WR3A, 3B, and 3C.
WR4 − Composite of subsamples WR4A, 4B, and 4C.
BACKGROUND − From the Big Seven Mine (07−156−SL−1).

SW1 − Above tailings.
SW2 − Below waste rock dump 3.
SW3 − Adit #1 discharge.
SW4 − Same as sample SE4.

XRF ANALYSIS RESULTS

BIG SEVEN MINE
PA NO. 07-156

Mine Name: Big Seven PA# 07-156
XRF Field Analyses
Results in PPM
Page 1 of 2.

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
07-156-CONC			2550.6	660.844		728.461 *	94274.5		1205.15	52943.4		148.482 *
07-156-SE-1			9006.49	1886.59		8987.36	31651.8			1657.25		132.342
07-156-SE-4			16754.5	2947.15	144.744 *	1592.5 *	45318.1			307.055		372.746
07-156-SE-5			5696.73	1906.38		7574.31	27550.6		68.051 *	1244.85		121.959
07-156-SE-6	421.111 *		16451.2	3061.77	232.289 *	2277.22	46408.4		66.0838 *	577.208		263.711
07-156-SL-1			4834.62	2832.3		837.167 *	24415.1			331.83		138.842
07-156-TP1-A			11019.4	2808.2	136.52 *	3280.41	19746.5		67.5727 *	1399.66		116.429
07-156-TP1-B			14297	2865.75		4680.21	38859.4		73.8399 *	1851.77		89.1753
07-156-TP1-C			7223.57	2434.41		5039.07	21211.1		75.5651 *	1850.58		88.471
07-156-TP3-A			4001.9	2610.87		2873.97	16552.8		61.7759 *	1382.79	73.6259 *	43.5597
07-156-TP3-B			5940.67	3026.27	143.99 *	5658.58	22632.5			1526.15	71.6204 *	37.2659
07-156-TP-2			12044.2	2222.72		4451.14	21260.5			1794.34		112.197
07-156-WR1-A			4698.44	2206.18		4369.64	87950.8		81.2486 *	979.442	630.943	87.8756
07-156-WR1-B			6242.12	2815.02		746.612 *	76701.2			388.596	171.63 *	214.467
07-156-WR1-C			21285.3	2921.77			94998.7			249.281	873.962	652.516
07-156-WR2-A			12081	2301.48			34409.4			4896.86		52.782
07-156-WR2-B			3085.87	3484.3			31767.6			1257.89	109.376 *	71.1503
07-156-WR2-C			11847.9	3285.52			60458.2			1140.04	287.801 *	111.855
07-156-WR3-A			1650.67	2664.38			12079.7			326.538		125.285
07-156-WR3-B			6481.1	3429.01			12511.6			340.861	152.535 *	27.6921
07-156-WR3-C		23028.8	2104.16	2049.66	162.838 *		87335			254.068	520.18	75.1158
07-156-WR4-A			1572.88	2662.75			22662.2			466.022		43.0709
07-156-WR4-B			2357.58	3483.77			28624.4			136.413 *		65.076
07-156-WR4-C			2389.18	4137.21			33947.4			302.457		55.2517
07-156-WR-1-COMP			11137.6	2535.34		1860.17	75384		98.9436 *	450.374	447.172	361.593
07-156-WR-2-COMP			10110.7	2245.98		1696.28 *	73534.9		67.6742 *	446.601	431.261	346.328
07-156-WR-3-COMP			3940.15	3306.73		500.326 *	50375.8			314.791	304.286	93.3637

Mine Name: Big Seven PA# 07 – 156
XRF Field Analyses
Results in PPM
Page 2 of 2.

XRF SAMPLE ID	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
07 – 156 – CONC				76303.2	99.724 *	677.673	249.888 *	77.46 *	391.23		118.327 *
07 – 156 – SE – 1	177.372			536.088	109.205			415.005	68.2356 *		15.2938 *
07 – 156 – SE – 4	145.806			43.6851 *	42.4698 *			490.226	97.3082 *		
07 – 156 – SE – 5	149.501		16.7009 *	465.717	101.56			809.752	93.4625 *		9.93503 *
07 – 156 – SE – 6	115.639			65.1582 *	39.8725 *			363.887	108.99 *		
07 – 156 – SL – 1	247.575			273.973	128.057	99.5105 *		506.18			
07 – 156 – TP1 – A	164.374		12.6832 *	1201.48	168.611			918.139	92.75 *		21.1735 *
07 – 156 – TP1 – B	111.214		19.8981 *	2115.34	226.364			390.929	140.161 *		15.2012 *
07 – 156 – TP1 – C	122.728			2292.5	136.767			385.805	130.671 *		
07 – 156 – TP3 – A	179.327		35.7658	408.693	143.182			365.236	101.898 *		
07 – 156 – TP3 – B	168.429		28.5639	414.705	144.129			255.591	114.386 *		13.5168 *
07 – 156 – TP – 2	170.852		10.7084 *	1451.52	151.57			722.868			
07 – 156 – WR1 – A	124.51		23.4756 *	818.956	133.307			315.242	203.114 *		19.787 *
07 – 156 – WR1 – B	384.55		7.75613 *	292.477	116.295			763.457			10.5467 *
07 – 156 – WR1 – C	174.275		67.5686	324.294	121.051			990.309	169.747 *		14.5812 *
07 – 156 – WR2 – A	123.396		29.5412	3108.77	171.055	99.0551 *		411.018	205.534 *		18.8774 *
07 – 156 – WR2 – B	192.507		30.0371	857.493	214.334	111.838 *	46.7935 *	580.3	247.169		
07 – 156 – WR2 – C	128.552			3634.85	125.509			310.011	106.104 *		17.2373 *
07 – 156 – WR3 – A	212.175		22.295	804.454	174.017		30.3626 *	530.912	156.921 *		18.8424 *
07 – 156 – WR3 – B	117.987		11.651 *	237.684	231.664			259.279			15.7918 *
07 – 156 – WR3 – C	197.63		47.7754	491.166	193.721			275.335	130.041 *		
07 – 156 – WR4 – A	133.359		12.9485 *	1241.87	204.458		46.2327 *	366.719	76.7717 *		22.7961 *
07 – 156 – WR4 – B	136.357			1600.51	231.752			363.388	75.0615 *		19.3757 *
07 – 156 – WR4 – C	127.249		14.3902 *	2320.44	242.947		43.1147 *	344.463	80.4304 *		26.1971 *
07 – 156 – WR – 1 – COMP	269.803		73.4486	403.933	99.6453			771.004	154.307 *		12.0629 *
07 – 156 – WR – 2 – COMP	249.319		66.093	407.689	121.468			717.111	85.2903 *		10.8775 *
07 – 156 – WR – 3 – COMP	133.308		24 *	517.462	211.167			557.052	166.362 *		15.9252 *

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

BIG SEVEN
PA NO. 07-156

AIMSS SCORESHEET

SITE NAME: BIG SEVEN MINE
PA NUMBER: 07-156

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	19.714
6	GW - TARGETS	WELLS - 1 MI. x 2.5		7.5
7		WELLS - 1 TO 4 MI		10
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	17.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	137998
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		300
12		EXCEEDENCES		100
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	800
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	21.465
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		3
18		WETLANDS		10
19		FISHERY		5
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 - 22	25
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	429300
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		20
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	100
27		LIKELIHOOD SCORE	LINES 25 + 26C	100
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.260
29	AIR - TARGETS	POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		0
31		WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 - 33	30
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	780
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		0
37A		ACCESSIBILITY		5
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	25
38		LIKELIHOOD SCORE	LINES 36 + 37C	25
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.240
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		0
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 - 42	0
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	0
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**5.68**

SITE NAME: BIG SEVEN MINE
PA NUMBER: 07-156

LINE NO.		SITE SAFETY		
1	THREAT	ACCESSIBILITY		5
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	100
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	75
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		100
8		HAZARDS SCORE	SUM LINES 2 - 7	275
9		POPULATION - 1 MILE		0
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 - 11	0
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**0.00**

SUMMARY OF HISTORICAL ANALYTICAL DATA FROM OTHER SOURCES

DATE: November 15, 1990

CLIENT: **Abandoned Mines**

FIELD ID: Snow Creek at Carpenter Creek

Water Below Big 7

LAB NO: W8631

DATE RECEIVED: 09/24/90

Hardness 79 mg/L as $CaCO_3$

Total Metals

As <0.001 mg/L

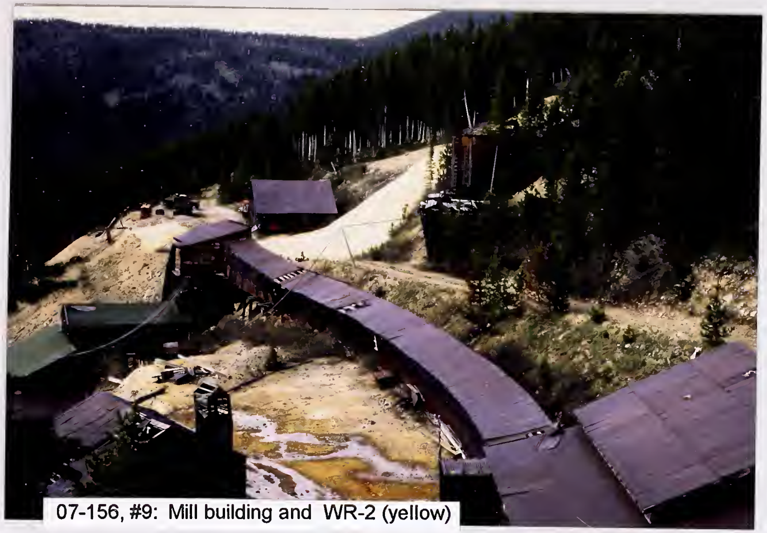
Cd 0.0023 mg/L

Cu <0.02 mg/L

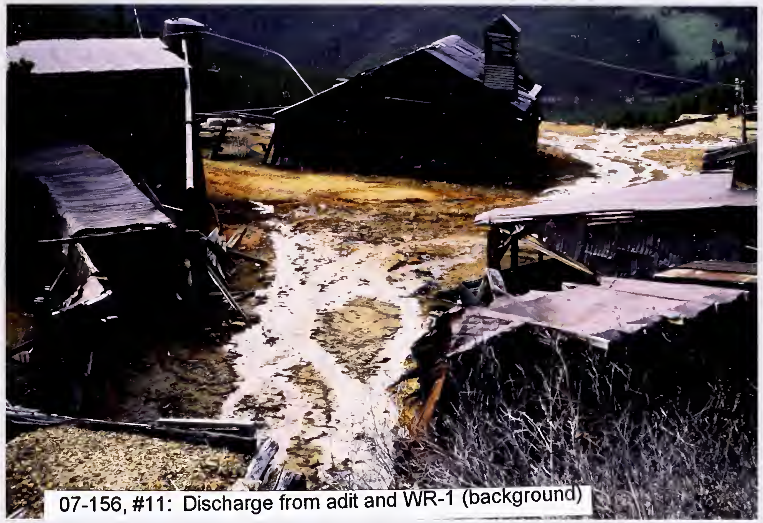
Fe 0.04 mg/L

Pb <0.001 mg/L

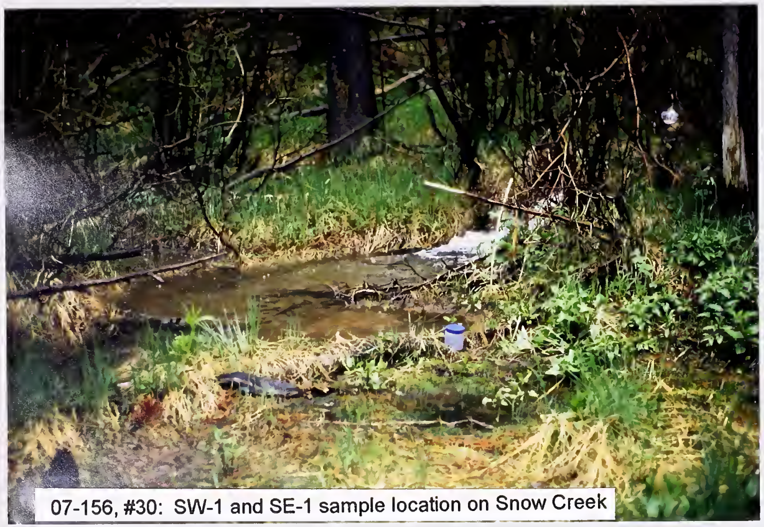
Zn 0.98 mg/L



07-156, #9: Mill building and WR-2 (yellow)



07-156, #11: Discharge from adit and WR-1 (background)



07-156, #30: SW-1 and SE-1 sample location on Snow Creek

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: BAKER PA#: 07-180

Date: July 29, 1993 Time: 1000-1100

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Clark, Pioneer
Pierson, TD&H

Visitors: None

Weather/Seasonality Observations: Partly cloudy; light showers; 50° to 60°F; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): No photos were taken. Video Tape No. 4

General Comments/Observations (not covered specifically in attached Inventory Forms): Baker workings are very small in comparison to the Vilipa workings in the Mackay Creek drainage directly below.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Remove waste from drainages; amend and revegetate.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): BAKER PA#: 07-180

Legal Description: T 14N ;R 8E ;Sec. 16 , SW1/4 NE1/4 ___1/4

County: CASCADE Mining District: NEIHART

Latitude: N 46° 58' 39" Longitude: W 110° 42' 40"

Primary Drainage Basin and Code: Belt Creek/10030105
Secondary Drainage Basin: Mackay Creek

USGS Quadrangle map name(s): Neihart

Mine Type/Commodities: Hardrock/Silver, Gold, Zinc, Lead, Copper

Activity Status: Active___, Inactive/Exploration___, Abandoned X .

Ownership status: Known YX N__; private/public? Private
Owner, Agent, or Contact(Include address and phone when available): Peter Antonioli, Alexandra Resources Co., P.O. Box 791, Butte, MT 59702. (406) 723-8730.

Relationship to other mines/sites in the area/district: Located on the other side of Mackay Creek from Vilipa. Mineralization is the same type as the Silver Dyke mine. The site is part of the Hegener Group, which is composed of the Vilipa, Gold Rock, and Copper Queen.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 6300', Slope 20°, Aspect Northeast

Land use: Mining___, Recreational X , Residential___, Urban___, Agricultural___, Other(Specify)

Area of disturbed/unvegetated lands? 0.5 acres.
Dimensions: Approx. 160 feet x 160 feet

Predominant vegetation types: Lodgepole pine forest

Access: roads - good___, poor___, 4wd___, trail___.
Other logistical considerations (proximity to other sites). Located directly above and southwest of the Vilipa mine.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 2 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). The site lies on the southwest side of perennial Mackay Creek. Mackay Creek flows southeast to confluence with Carpenter Creek approx. 1/2 mile below the site. The creek is also identified as Hegener Creek in some literature. The site is underlain by various gneisses, pinto diorite, and the Snow Creek quartz porphyry; all are crossed by complex network of quartz porphyry and granite porphyry.

Mining/milling history, ore type/tenor, host rock, gangue: A few small shipments were made in 1922 from Hegener Group including the Baker. The Baker is on a wide low grade mineralized zone containing chalcopyrite. Ore contains high ratio of copper to silver and contains tetrahedrite.

Mine Operation?

Shafts - Yes___, No X , # ____, Comment

Adits - Yes X , No___, # 2 , Comment Partially caved

Pits - Yes___, No X , # ____, Comment

Placers - Yes___, No X , # ____, Comment

Other - Yes___, No X , # ____, Comment

Mill Operation? Yes____, No X . If yes answer the next three questions:

Period(s) of Operation: N/A

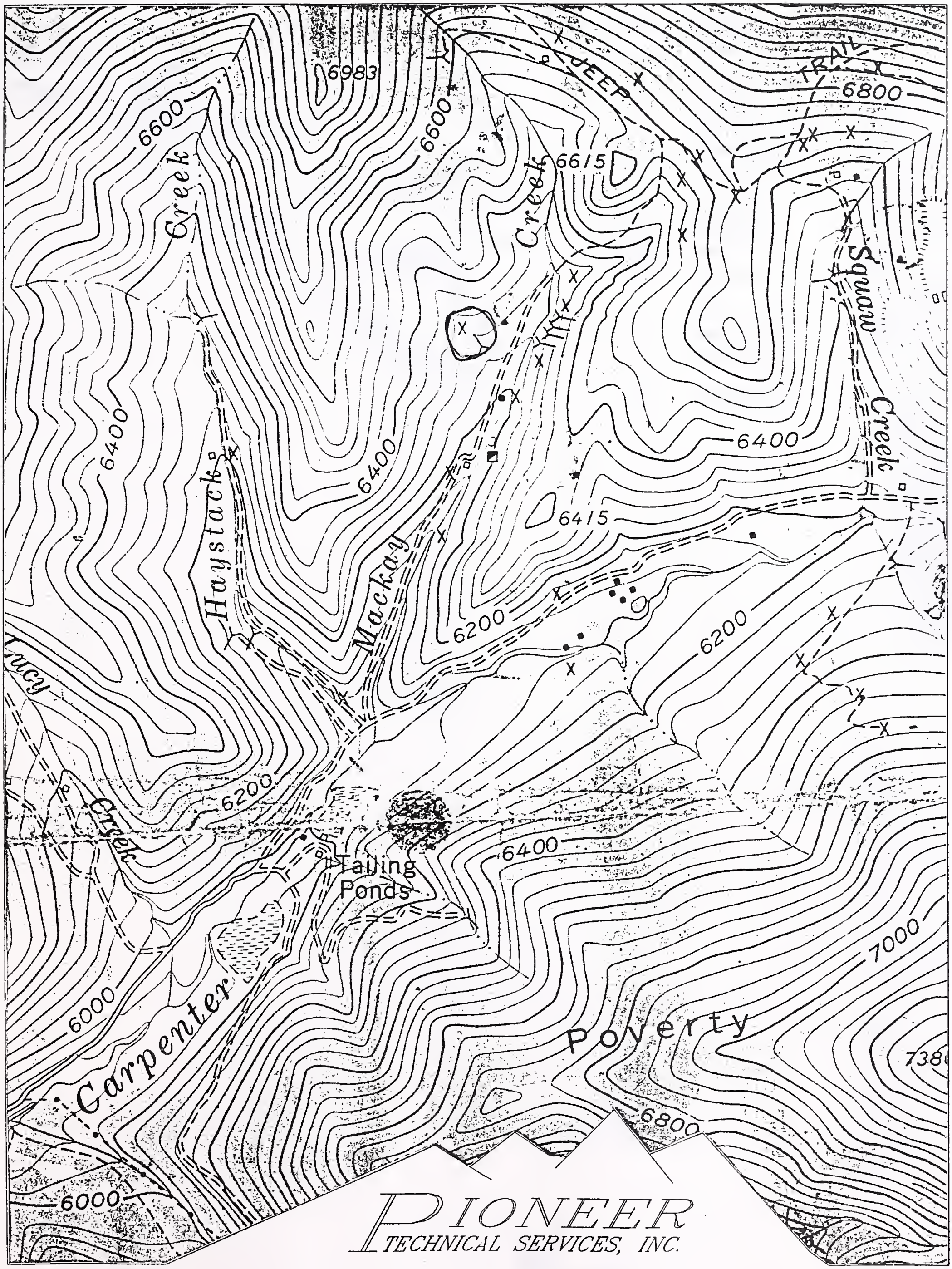
Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
N/A

Montana Bureau of Mines and Geology
Water Well Log Data

11/10/1993

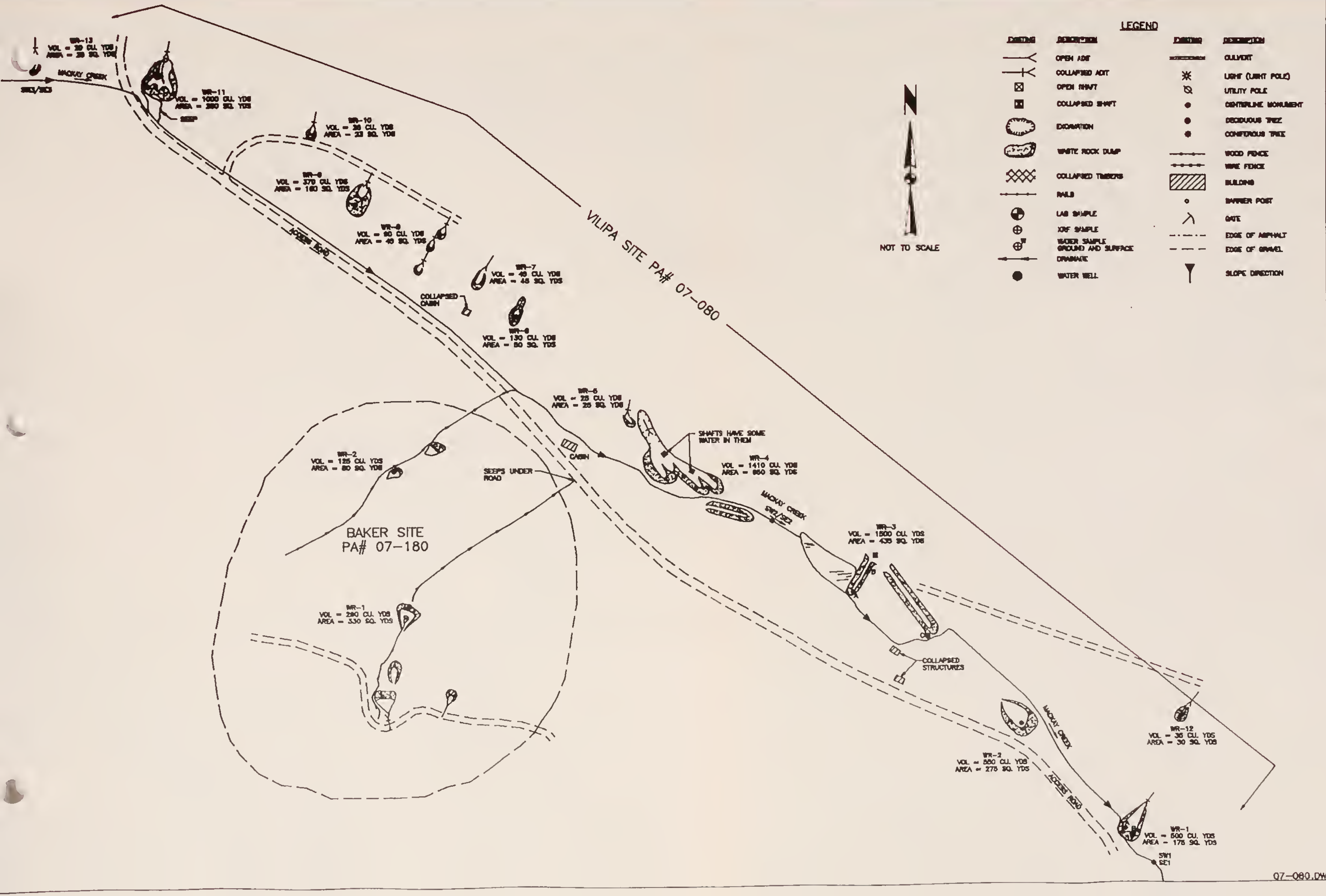
W[illegible] No.	Location	Depth	Yield	Static Water Level
M:123062	14N 08E 20 DBA	41.0	4.0	24.00
M:123061	14N 08E 20 DBA	40.0	7.0	0.00



PIONEER
TECHNICAL SERVICES, INC.

BAKER, P.A. NO. 07–180

T14N, R08E, SECTION 16
SCALE: 1″ = 1000′



07-080.DWG

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

VILIPA & BAKER PA# 07-080 & 180
NEIHART DISTRICT CASCADE COUNTY

PIONEER

DRAWN MWC DATE 12/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

TD&H

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

SHEET NO.

SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Bullock

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1	WR	290	East side of site with ponded water on the dump; north end	None	6.9 (D)	0.05	07-180-WR-1	07/29/93 1415	T-Metals, ABA
WR-2	WR	125	Dump associated with vent stack; east side on top	None	6.1 (D)	0.08			

*D-Direct reading (Kelway Meter); S-Saturated Paste (Orion Meter)

Comments or deviations from SOPs: 07-180-WR-1 is composite of WR-1 and WR-2.

MDSL AMRB/PIONEER 4/9/93

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No_X_, Number:____ Identification:__________

Filled shafts: Yes___, No_X_, Number:____ Identification:__________

Seeps/Springs: Yes_X_, No___, Number:_1_ Identification:_Just below old road above WR-1_

Groundwater wells within 4 miles?: Yes_X_, No___;
Number of well logs:_21_

Distance to nearest well used for drinking?_1/2 mile northeast on Squaw Creek_

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible_X_, Unlikely____.
Workings are situated in drainages which may facilitate infiltration of surface water through wastes and into groundwater.

Other observations/notes:_N/A_

GROUNDWATER INVENTORY FORM

SAMPLERS: ______

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X, No ____, Name(s): Two small unnamed tributaries to Mackay Creek

Dry streambeds: Yes ____, No X, Name(s):

Other surface water: Yes X, No ____, Name(s)/Description: Ponded water on WR-1

Waste materials within any floodplain: Yes X, No ____ Source ID(s): WR-1 and WR-2

Approximate Flood frequency? X 1 yr, ___ 10 yr, ___ 100 yr

Estimated seasonal flow of stream(s) (cfs)?
High Flow: 100 gpm, Average Flow: 10 gpm

Distance between waste source(s) and nearest surface water body (ft)? 0 feet; seep flows onto and under WR-1. WR-2 and other waste rock have unnamed tributary flowing next to it.

Surface water draining onto or through waste sources: Yes X, No ____,
Describe: See above

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Fishery (Belt Creek), wetlands, stock watering

Observed erosional/sedimentation/stream turbidity problems? Yes X, No ____, Distance downstream (ft)? 150 Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): Waste rock eroding from dumps is deposited as sediment in both of these small unnamed tributaries to Mackay Creek approx. 150 feet down to their confluence.

SURFACE WATER INVENTORY FORM

SAMPLERS: Bullock

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	Small tributary that flows from WR-1 to confluence with Mackay Creek	7.24	40	280	10.8	NM	NM	N/A	N/A	Field Parameters
SW-2	SW	Small tributary that flows past WR-2 to confluence with Mackay Creek	6.14	40	277	11.9	NM	NM	N/A	N/A	Field Parameters

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 10 to 15 acres in Mackay Creek drainage

Wetlands present: Yes X , No ___, Describe: Approx. 2 acres along Mackay Creek

Carbonate rocks/soils: Yes ___, No X , Describe: ___

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X ; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments ___

Nearest residence(ft or miles)? 1/2 mile, northeast on Squaw Creek

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH /MODERATE/LOW/NONE)
WR-1	FEOX	Partial	2,610	2,610	Yes	None
WR-2	FEOX	Partial	720	720	Yes	None

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes_____, No_X__,
Describe:______________________________

Population within 1 mile: 1-10_X_; 10-30___; 30-100___; 100-300___;
300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments______________________________

Evidence of recreational use on site: Yes___, No_X_, Describe: There is evidence 200 feet below this site at the Vilipa site.

Accessibility - Fences, warning signs, closed roads? Unrestricted

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment__________
Wilderness Area - Yes___, No_X_, Comment__________
T&E Species Habitat - Yes___, No_X_, Comment__________
Bat Habitat - Yes___, No_X_, Comment__________

Primary Drainage_X_; Secondary Drainage___; No Information___:

Riparian Habitat Quality - High_X_, Medium___, Low___
Wetlands Frontage - High___, Medium_X_, Low___
Fisheries Habitat and Species Classification - _3_
Sport Fishery Classification - _3_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_2_, types and locations: Partially open adits

Hazardous structures: Yes___, No_X_, Number____, types and locations:_

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____,
types and locations:______________________________

Unstable waste piles, impoundments, undercut banks: Yes_X_, No____,
Number_2_, types and locations: Some erosion is occurring on two of the dumps located in the drainages.

Fire and/or Explosion hazards: Yes___, No_X_, Explain:__________

Bibliography

MBMG, Geology and Ore Deposits of the Neihart Mining District, Cascade County, Montana, Memoir 13, Written by Paul A. Schafer, July 1935.

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Baker, Prepared by Chen-Northern, October 31, 1989.

USBM, Mines and Mineral Deposits (Except Fuels), Cascade County, Montana, Information Circular No. 7589, Written by Almon F. Robertson, April 1950.

USGS, Topographic Map, Neihart, Montana, 7 1/2 minute Quadrangle, 1961.

LABORATORY ANALYTICAL DATA

BAKER
PA NO. 07-180

Baker PA# 07–180
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – BULLOCK
INVESTIGATION DATE: 07/29/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
07–180–WR–1	11	394 J	1.3	1.5 U	1.7	163 J	19000	0.95 J	9.9	2 U	1060 J	14 J	68 J	NR
BACKGROUND	10.5	131	1.4	6.83	22.2	26.1	20600	0.048 U	607	15.6	667	3.39 UJ	548	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
07–180–WR–1	0.19	5.94	–2.02	–7.96	0.16	0.01	0.02	0.31	–2.33

LEGEND

WR1 – Composite of subsamples WR1 and 2.
BACKGROUND – From the Silver Dyke Adit (07–135–SS–1).

XRF ANALYSIS RESULTS

BAKER
PA NO. 07-180

Mine Name: Baker PA# 07-180
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
07-180-WR-1		32517	1307.15	363.63 *	161.76 *	375.713 *	24868.4		66.228 *	74.4654 *		100.333
07-180-WR-2		24841	1410 $	995	57 $	134	27249	147	204	153 $		222
07-180-WR-1-COMP		27950.2	1347.12	810.974		249.824 *	23742.8		217.631	123.764 *		227.699

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
07-180-WR-1	129.196		195.147	1019.91	195.458		205.354	1231.33		16.4676 *	40.9338
07-180-WR-2	199 $		183	697	192	72	20	1642 $		23	48 $
07-180-WR-1-COMP	172.632		158.011	726.542	196.603			1716.76	92.1857 *	27.6482 *	50.9802

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

BAKER
PA NO. 07-180

AIMSS SCORESHEET

SITE NAME: BAKER MINE
PA NUMBER: 07-180

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.122
6	GW - TARGETS	WELLS - 1 MI. x 2.5		5.0
7		WELLS - 1 TO 4 MI		19
8		NEAREST WELL		5
9		TARGETS SCORE	LINES 6 + 7 + 8	29.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	1415
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	400
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.134
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		5
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 - 22	22
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	1179
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		1
26B		DISTANCE TO POPULATION		10
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	10
27		LIKELIHOOD SCORE	LINES 25 + 26C	10
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.005
29	AIR - TARGETS	POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		5
31		WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 - 33	45
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	2
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		0
37A		ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		10
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	200
38		LIKELIHOOD SCORE	LINES 36 + 37C	200
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.004
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		1
41		NEAREST RESIDENCE		5
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 - 42	6
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	5
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**0.03**

SITE NAME: BAKER MINE
PA NUMBER: 07-180

LINE NO.		SITE SAFETY		
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	100
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 - 7	100
9		POPULATION - 1 MILE		1
10	TARGETS	NEAREST RESIDENCE		5
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 - 11	6
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**12.00**